2.0 Proposed Action and Alternatives

2.1 Formulation of Alternatives

This chapter describes the alternatives considered in this EIS. These alternatives were developed in response to issues and concerns from public comments submitted during the public scoping period and interaction between resource specialists.

In addition to the No Action Alternative, the proponent's Proposed Action and two other action alternatives are analyzed in detail. The Record of Decision (ROD) may include individual elements from any of these alternatives.

The BLM also considered alternatives raised during the scoping process that are not carried forward for detailed analysis. These alternatives, together with the reasons why they were not included for detailed analysis, are described in Section 2.3.

This chapter concludes with a summary of the environmental effects of the Proposed Action and the other alternatives that are analyzed in the EIS.

2.2 Summary of Alternatives

A brief summary of the alternatives analyzed in detail is included in this section.

2.2.1 No Action Alternative

The No Action Alternative would deny the approval of the proposed project and would not modify the existing potash leases. Current land and resource uses would continue under current conditions in the project area.

2.2.2 Alternative A—Proposed Action

The Proposed Action would include approval of Intrepid's HB In-Situ Solution Mine Operation and Closure Plan, granting new ROWs, approval of permits to drill new water supply, injection, extraction, and monitoring wells, and approval of required lease modifications. Following is a brief summary of Intrepid's proposed operations, projected to function for 28 years. More detail is included in Section 2.4.2.

- Pumping and conditioning of groundwater from seven Rustler Formation wells to form an injectate solution.
- Transport of the injectate through a surface piping system and injection of the solution through six wells into the lower portions of four separate former underground mine workings.
- Extraction of the resulting pregnant brine from the underground mine workings through five extraction wells.
- Pumping the brine through aboveground pipelines to evaporation ponds where the potassium and sodium salts (KCl and NaCl, respectively) would be precipitated.
- Harvest of precipitated potash and salt from the evaporation ponds and transport to a new flotation mill (HB Mill).

- Refinement of ore to marketable potash product at the new HB Mill and the existing Intrepid North Plant. Recycling of NaCl tailings to condition the injection source groundwater to be used for injectate.
- At the completion of the project, all project components and all disturbed areas would be reclaimed and infrastructure would be decommissioned.

2.2.3 Alternative B—Supplemental Water Sources

This alternative would include approval of Intrepid's mine operation and closure plan, granting new ROWs, approval of required lease modifications, and approval of permits to drill new water supply, injection, extraction, and monitoring wells. Additional water sources from Intrepid's Caprock wells east of the project area would be used to supplement the saline water whenever the Rustler water supply is inadequate to meet the optimum filling rate of the flood pools. Intrepid's existing pipelines from the Caprock wells would be improved. Fewer Rustler wells and pipelines would be developed, but all of the other facilities and process plans would be the same as the Proposed Action.

2.2.4 Alternative C—Buried Pipelines

This alternative would approve Intrepid's HB In-Situ Solution Mine Operation and Closure Plan, grant ROWs with modifications designed to limit surface facilities, approve permits for new water supply, injection, extraction, and monitoring wells, and approve lease modifications. Intrepid's proposal would be modified to bury all pipelines. The layout of the pipeline system would be the same as that described for Alternative A, Proposed Action.

2.2.5 Alternative D—Preferred Alternative

According to CEQ's NEPA regulations at 40 CFR Section 1502.14(e), the agency's preferred alternative should be identified in the Final EIS. This alternative must fulfill the BLM's mission and responsibilities, while giving consideration to economic, environmental, technical, and other factors. This alternative is designed to minimize the impact to wildlife from habitat fragmentation and to allow better emergency and grazing access than under the Proposed Action. It would also mitigate conflicts with OHV users. The BLM, as the decision-maker, selected aspects of Alternatives A, B, and C to develop the Preferred Alternative. This alternative includes approval of Intrepid's revised HB In-Situ Solution Mine Operation and Closure Plan, granting new ROWs, approval of lease modifications to remove 12,867 acres from the 96,000-acre conventional mining lease limit per state, and approval of permits to drill new water supply, injection, extraction, and monitoring wells. The overall footprint of the evaporation ponds would increase by 62 acres. There would be minor changes to the layout of the pipelines in the project area to avoid karst features and improve the efficiency of layouts for a variety of reasons. Approximately 68 percent of the pipeline bundles would be buried. Within the project area, four Rustler wells would be developed and additional water sources from Intrepid's Caprock wells east of the project area would be used to supplement the required water quantity whenever the Rustler water supply is inadequate to meet the optimum filling rate of the flood pools. A new pipeline from the Caprock wells would be installed along an alignment designed to avoid sand dune lizard habitat. All of the process plans would be the same as the Proposed Action.

2.3 Alternatives Considered but Eliminated from Detailed Analysis

2.3.1 Conventional Underground Mining of Remaining Reserves

This alternative would involve conventional, physical mining of the remaining potash reserves in the proposed flood zones, without any in-situ flooding. Although areas of second mining still contain approximately 30 percent of the original ore in place, they can no longer be safely accessed because convergence (settling of the mine ceiling) has made these portions of the mine impassable. To extract the remaining ore, workers and equipment would need to physically access the pillars, remove them, and transport the ore to the surface. The existing HB shafts and hoists are not operational and the

ventilation and utility systems would have to be restored to comply with Occupational Safety and Health Administration (OSHA) and Mine Safety and Health Administration (MSHA) operational conditions, which would not be feasible for the second mined areas.

This alternative has been eliminated from detailed analysis because it does not meet the purpose and need of allowing technically viable development that would comply with existing mine and safety regulations. It would not be safe to extract the potash from the inactive workings (HB Crescent, HB North, HB South, and HB Eddy) through conventional mining methods.

2.3.2 Solution Mining of Additional Potash-bearing Formations within the Secretary's Potash Area

This alternative would involve the injection of saline brine to the SPA to leach the in-place water-soluble minerals from unmined formations. This in-situ solution mining would be more extensive than the Proposed Action. This alternative differs from the Proposed Action in that hot water is typically used as a solvent, which is injected into productive formations through cased boreholes. In this process, the brine flows through the target formation, and is extracted through another borehole, to be processed to remove the potash. Existing mine workings are not required for this process.

With current technology, the potash ore suitable for solution mining is located in the first ore zone within the SPA where the ore is high in potassium, located in a continuous ore body, and low in undesirable minerals such as sulfur and magnesium. Solution mining of potash with high levels of sulfate and magnesium chloride would require a much larger area for evaporation ponds because the concentration of potassium chloride in the injectate would be approximately half that of the levels in the first ore zone currently proposed for solution mining under the Proposed Action. Additional land also would be required for separating and storing the undesirable minerals that must be transported off-site for disposal. While potassium magnesium sulfate (langbeinite) can be processed into a saleable product, this process is not part of Intrepid's future plans.

Consideration of the elevations of other potash-bearing formations is another key factor in determining the location of ore that is suitable for solution mining. Not all potash-bearing formations could safely be produced through solution mining because targeted areas must be located where active mines and operating oil or gas wells would not be flooded.

The 1986 Order provides policy and guidance for concurrent development of potash and oil and gas (see **Appendix A** for copy of the full 1986 Order). A condition to granting potash leases listed in the 1986 Order is that:

> All potash permits and leases hereafter issued or existing potash leases hereafter renewed for Federal lands within the designated Potash Area, shall be subject to a requirement either to be included in the lease or permit or imposed as a stipulation, to the effect that no mining or exploration operations shall be conducted that, in the opinion of the authorized officer, will constitute a hazard to oil or gas production, or that will unreasonably interfere with orderly development and production under any oil or gas lease issued for the same lands.

Any new project would be evaluated on a case-by-case basis in order to evaluate project-specific resource concerns and to ensure compliance with the 1986 Order. Solution mining also would be limited to leases held by the operator.

This alternative has been eliminated from detailed analysis for the following reasons.

- The proposal would not meet the purpose and need of allowing technically viable potash development. Current information shows that most of the SPA does not contain the contiguous, high quality potash ore in sufficient quantity needed for viable solution mining.
- Solution mining of all potash-bearing formations within the SPA would not meet the purpose and need of complying with the 1986 Order. There are many areas within the SPA that cannot be flooded due to safety concerns. The elevation of the injectate flood pools must be controlled to avoid flooding active mines and operating oil or gas wells, otherwise they pose a hazard to production and would unreasonably interfere with oil and gas development. Giving priority to potash mining over fluid minerals in the project area would not be in compliance with the 1986 Order or BLM policy, which requires concurrent development.

2.3.3 Smaller Flood Area

This alternative would use smaller flood zones and lower flood elevations in each of the four targeted mine workings. Because less water would be required, lower pumping rates would be needed to fill the flood pools but the same infrastructure (pipelines, roads, mill) would be needed as described under the Proposed Action. Lower quantities of potassium-bearing salts would be processed, resulting in reduced potash production, lower revenues, and less efficient resource recovery.

This alternative has been eliminated from detailed analysis because it would not meet the purpose and need for the project, which describes the BLM's responsibility to support the orderly and efficient development of leasable minerals in accordance with applicable federal law, including Title 30, Chapter 2, Section 21a, which requires wise and efficient use of mineral resources. In addition, this alternative would not meet the requirement for ultimate maximum recovery of mineral resources under 43 CFR 3594.1. Maximum recovery of potash would not be achieved, resulting in a waste of the resource, while the same amount of surface disturbance for infrastructure would be needed. Undue waste of mineral resources also is prohibited by the FLPMA and MLA.

2.3.4 Larger Flood Area

This alternative would involve the in-situ extraction of potash in the same targeted mine workings as those described under the Proposed Action but using a larger flood pool. Flood control in the mine workings is based on the geologic structure and elevation of the mine features, so the larger flood pool would be accomplished by setting a higher maximum elevation of the injected brine than that selected for the Proposed Action.

Setting higher flood elevations in HB Crescent and HB North mines would pose unacceptable risks to the safety of underground personnel in Intrepid's operating West Mine, a conventional mine that has underground connections due to previously established drifts. If higher flood elevations were set in HB South and HB Eddy mines, the flood pool may reach operating oil wells in the Barber Field through existing underground connections. Flooding the HB2 East mine would not be safe because it has underground connections to Intrepid's West Mine.

This alternative has been eliminated from detailed analysis because it does not meet the purpose and need of complying with existing mine and safety regulations and it would violate the 1986 Order. A larger flood zone in the four targeted mine workings would threaten the safety of workers in Intrepid's West Mine. It might also adversely affect operating oil wells in the Barber Field, constituting a hazard to oil or gas production in violation of the 1986 Order.

2.3.5 Allow Expansion of Oil and Gas Development in the Project Area

Public comments submitted during the scoping period requested consideration of an EIS alternative that gives increased access to development of oil and gas reserves within the project area. This alternative would remove the suspension of oil and gas leases to allow more drilling and production in the project area.

The 1986 Secretary's Potash Order provides policy and guidance for concurrent development of oil and gas and potash (see **Appendix A** for copy of the full 1986 Order). A condition to the granting of oil and gas leases listed in the 1986 Order includes two relevant requirements:

1. Drilling cannot interfere with "the mining and recovery of potash deposits," a situation to be determined by the BLM Authorized Officer.
2. Oil and gas wells cannot be drilled at a location that would "constitute a hazard to or unduly interfere with mining operations being conducted for the extraction of potash deposits."

The 1986 Order further states that the USDI should "deny approval of most applications for permits to drill oil and gas test wells from surface locations within the potash enclaves" with the following two exceptions that are up to the discretion of the BLM Authorized Officer.

- Drilling shall be allowed from barren areas within the potash enclaves when "such operations will not adversely affect active or planned mining operations in the immediate vicinity of the proposed drillsite."
- Drilling shall be allowed from a drilling island located where there are no barren areas within the enclave or where the objective oil and gas formation beneath the lease cannot be reached by a well drilled from a permitted location within the barren area or by a well directionally drilled from a surface location outside the potash enclave.

Many of the suspended oil and gas leases lie beneath open potash mine workings. Many of these potash workings, even long inactive ones, connect directly to workings that are being actively mined. Drilling wells though open mine workings would potentially allow for the flow of oil, water, and gases into the active mines and pose a health and safety hazard to mine workers.

This alternative has been eliminated from detailed analysis because it does not meet the purpose and need of complying with the 1986 Order. Giving priority to fluid minerals over potash mining in the project area would not be in compliance with the 1986 Order or BLM policy, which requires concurrent development. In addition, drilling through open mine working would be in violation of the part of the 1986 Order specifying that oil and gas cannot be drilled in a location that would pose a safety hazard to potash mining.

2.3.6 Use Capitan Aquifer as Water Source

One comment received during the comment period for the Draft EIS recommended that brine from the Capitan Aquifer be considered as a potential source of water for the solution mine project to provide an alternative to extracting water from either the Rustler Formation or the Caprock Aquifer. In response to this request, the BLM considered whether this would be a viable option to be analyzed in the EIS. A summary of those findings is provided below.

The Capitan Aquifer lies beneath the HB In-Situ Solution Mine project area, mainly below Clayton Basin. The Capitan Aquifer is found within the Permian (Guadalupian) Capitan and Goat Seep limestones, as well as in the forereef and backreef facies that border the main limestone reef structure. In the project area, the Capitan Aquifer forms a band of water-bearing limestone between the Pecos River and the Eddy County/Lea County line. The Capitan Aquifer in and near the project area is 10 to 14 miles wide,

lies at a depth of 1,500 to 2,000 feet below ground surface, and is about 1,500 to 2,000 feet thick (Hiss 1976, 1975).

Before the formation of the Pecos River, the Capitan Aquifer was an integrated flow system that was recharged in the Guadalupe Mountains with groundwater flowing eastward and discharging near Hobbs, New Mexico. With the formation of the Pecos River in Pleistocene times, groundwater flow from the Guadalupe Mountains was intercepted by the Pecos River, causing groundwater flowing into the Capitan Aquifer east of the Pecos River in Eddy County to be reduced. There is a series of low permeability submarine canyons that bisect the reef and limit connectivity to the eastern and southern parts of the aquifer. Today, the Capitan Aquifer in northern Eddy County between the Pecos River and the Lea County line is confined and artesian. With little source of recharge and a low permeability submarine channel along the Lea County line, the groundwater flow is stagnant in northern Eddy County east of the Pecos River.

Aquifer tests report by Mercer (1983) and Richey and Wells (1984) show that the range in hydraulic conductivity for the Capitan Aquifer in northern Eddy County east of the Pecos River is between 1 and 25 feet per day, with most test values falling between 2.4 and 16 feet per day. The estimated average hydraulic conductivity is 5 feet per day. Test wells yielded on average less than 50 gpm (Hiss 1976). Overall, the permeability of the Capitan Aquifer in the project area is low, suggesting low well yields for water supply. This contrasts with the eastern side of the aquifer where higher yields have been documented in locations such as the Jal well field in Lea County.

There are 30 salt water injection wells injecting into or near the Capitan Aquifer in the vicinity of the project area. These wells may inject a variety of contaminants, including heavy metals. The effect of these wells on the water quality in the aquifer is unknown and would need to be analyzed before the water could be used for industrial projects such as the in-situ solution mine. The lack of information on the effects of the injection wells creates uncertainty as to the viability of the local Capitan water quality for long term usage. Acquiring the information needed to evaluate the Captain Aquifer for the HB In-Situ Solution Mine Project would be a time-consuming and expensive undertaking with a low probability success, given the existing data.

In summary, existing data suggest that it is unlikely that the Capitan Aquifer would provide an adequate supply the water to the HB In-Situ Solution Mine Project. Wells attempting to use the Capitan Aquifer water in the project area would likely be very deep with low yields. In addition, there are uncertainties regarding water quality due to the possible introduction of contaminants from the salt water injection wells. Intrepid does not have water rights in the Capitan and did not propose using this aquifer to supply project water. For these reasons, this alternative water source is unlikely to be suitable and was eliminated from detailed analysis.

2.4 Alternatives Analyzed in Detail

2.4.1 No Action

The No Action Alternative must be addressed under provisions of NEPA and serves as a basis for comparison of environmental impacts among alternatives. Under the No Action Alternative, the BLM would deny Intrepid's application for ROWs, mine operation and closure plans, and special use permits for in-situ solution mining. As a result, the proposed new surface pipelines, evaporation ponds, access roads, and new HB Mill would not be constructed, leaving the current uses of the land in the project area unchanged. The potential impacts to the human environment under the Proposed Action would not occur. Existing operations at Intrepid's West and East mines would continue under existing authorizations until the leased potash reserves are depleted. The No Action Alternative does not mean that there would be no impacts to the lands in the project area. Current mining operations and maintenance activities would continue.

There would be no change in Intrepid's federal potash lease acreage, currently 22,189 acres within the project area and 81,926 acres in the SPA. The BLM would consider lease modifications recently proposed by Intrepid, up to the maximum of 96,000 acres per state, in compliance with 43 CFR §3503.37, as amended.

Management of mineral leasing and development would continue to be governed by the federal 1986 Secretary's Potash Order and IM NM-2011-003, Interim Processing Guidelines, Oil and Gas Applications for Permit to Drill (APDs) within the "Secretary's Designated Potash Area," Carlsbad Field Office. Instruction Memorandum (IM) NM-2011-003 will remain in place until new standards for defining the potash enclave are approved. Mineral leasing and development also are managed under the State of New Mexico's Order No. R-111-P, Application of the Oil Conservation Division Upon Its Own Motion to Revise Order R-111, As Amended, Pertaining to the Potash Areas of Eddy and Lea Counties, New Mexico.

2.4.2 Alternative A—Proposed Action

The Proposed Action consists of constructing and operating an in-situ solution mining project in existing deep mine workings to recover and process potassium chloride ore from pillars and limited adjacent areas of the back, floor, and ribs. These mine workings are not in operation and the ore is currently not technically recoverable through conventional mining techniques. The area proposed for potash extraction occurs within existing Intrepid leases. Intrepid's existing leases affected by solution mining would be changed from conventional to solution mining leases and the acreage would not be counted against the 96,000-acre cap for each lessee in a state (43 CFR §3503.37, as amended).

The in-situ solution mining process would inject NaCl-saturated water into the deep mine workings. After allowing time for chemical reactions to occur, a mineral-rich solution with a high concentration of dissolved KCl derived from the mine workings would be pumped to the surface and transported to evaporation ponds. Once the mineral-rich solution evaporates in the ponds, the potassium-bearing and sodium-bearing salts precipitated (left behind in solid form) would be harvested from the ponds and transported for refinement in a newly constructed mill.

The project area consists of 38,453 acres, of which the majority is public land managed by the BLM. **Table 2-1** lists the acreage of each land status in the project area.

Table 2-1 Land Status in the Project Area

Owner/Manager	Acres
BLM	31,439
State of New Mexico	4,954
Private	2,060
Total	**38,453**

The project area encompasses 24,266 acres of federal potash leases. Four inactive workings totaling 10,930 acres would be partially flooded. The surface area of the flood pools is estimated to be 4,354 acres when full. For construction, it is estimated that a maximum of 274 workers would be employed for at least 3 months, and up to 263 workers would be employed during the second year of construction. During the operations phase, Intrepid would employ 36 workers for the 28-year life of the project, in addition to its current work force of over 600 employees.

Intrepid estimates total new investment of $120 million to $130 million for construction costs under the Proposed Action over a period of approximately 18 months. During the production phase, annual

production costs of between $11.4 million and $13.9 million are estimated. At full production, it is estimated that 175,000 to 185,000 tons of potash would be generated annually, for a total yield of 5 million tons over 28 years.

2.4.2.1 Components of Proposed Action

Groundwater Sources

A total of seven wells would be developed in the Rustler Formation to a depth of up to 500 feet to supply saline groundwater. The proposed wells, called Rustler Wells on **Figure 2-1**, are located within Sections 1 and 2 (5 wells shown, 4 would be drilled) of Township 21 South (T21S), Range 29 East (R29E), to the north and east of the proposed evaporation ponds, and within Section 4 of T20S, R30E (3 wells shown close together). Because lead contamination has been documented in the wells in Section 4 of T20S, R30E, the water coming from these wells must be treated to remove the lead before combining with the other Rustler well water to prepare for injection into the flood pools.

One of the wells in Section 2 has already been drilled as part of the initial evaluation during the preliminary engineering investigation for the project. Eight wells are displayed on the map because there are two optional locations in the area near the evaporation ponds. The decision on the location of which of the two options would be installed is dependent on the observations and yields of the other wells in the Section 2 area.

Each production well would be completed with a 10-foot by 6-foot concrete pad to support surface instrumentation, provide a maintenance surface, and provide for well casing integrity. A pilot/test/instrumentation (PTI) well would be drilled adjacent to each production well on a separate 10-foot by 6-foot concrete pad. The remainder of the 50-foot by 50-foot well pad would be surfaced with caliche, fenced, and surrounded by a berm to provide containment. Each of the Rustler water supply wells would include automated monitoring systems, controls, and backflow preventers to maintain flood level control and protect well integrity.

Fresh water from an established well field in the Caprock regional aquifer in Lea County would be used only for mill processing.

HB Mill

A new mill, called HB Mill on **Figure 2-1**, would be new construction, composed of a new building, flotation mill, filtration plant, clarifiers, and associated facilities. The total footprint of the HB Mill facilities would be approximately 4.5 acres on BLM land in Section 12, T21S, R29E.

Injection and Extraction Well Network

Six injection wells, five extraction wells, and three monitoring/extraction wells would be installed to enable the injection and extraction of brines to and from the former mine workings (see **Figure 2-1**). The injection wells would be sited in locations that would facilitate injection of the brine and gravity flow to the flood pools, generally on the uphill side of the targeted ore zone. The locations of the injection wells were selected to ensure that the brine would fill the lower mine workings up to the maximum flood elevation in the targeted area for the flood pool. Prior to the installation of the injection, extraction and monitoring/extraction wells, a small-diameter PTI well would be installed on the same well pad to determine site-specific subsurface conditions and as instrumentation/monitoring wells.

The extraction wells would be installed at a location suitable to enable the pregnant brine to be extracted from the lower portions of the flood pool. The monitoring/extraction wells located in the east-central part of the project area south of the flood pools would be used to check whether any pregnant brine flows outside and downslope from the flood pool. If monitoring detects underground pregnant brine outside the flood pool, the monitoring wells would be used to extract the brine to a pipeline designed to carry it to the evaporation ponds.

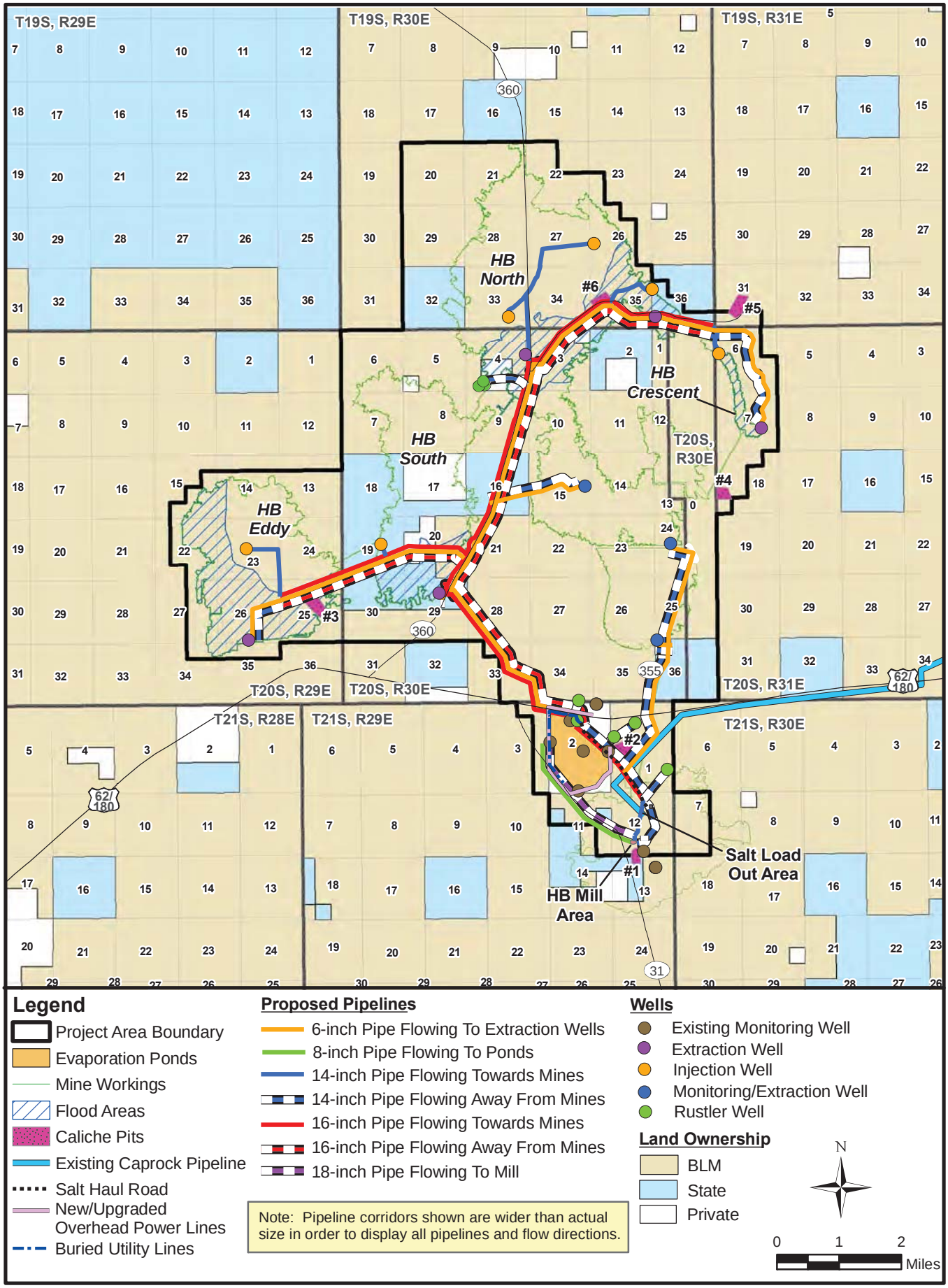

Figure 2-1 Facilities to be Constructed under the Proposed Action

Each well would be completed with a 6-foot by 10-foot concrete area within a fenced 50-foot by 50-foot pad to support surface instrumentation, provide a maintenance surface, and provide for well casing integrity. The remainder of the well pad not covered with concrete would be surfaced with caliche. All injection, extraction, and monitoring wells would include automated control systems to monitor and maintain flow rates and pressures, flood pool elevations, and well integrity.

A fully automated monitoring and control system for the wells would be implemented. All automated processes would be checked on a regular inspection schedule through calibration, manual measurement verification, visual inspection, and established field operation and maintenance procedures. The following would be installed:

- Downhole monitoring and data recording instrumentation for each of the six injection wells, five extraction wells, and three monitoring/extraction wells (provided by the PTI wells on the same pad).
- Well-head instruments to monitor such information as pressure, flow, voltage, amperage, annular pressure, selected water quality parameters, and pump performance.
- A centralized data acquisition and control center to manage data, control injection and pumping rates, execute alarms and automated contact trees, and allow manual overrides or adjustments.

Former Mine Workings to be Flooded

The existing mine workings to be flooded are the HB Potash North Mine, HB Potash South Mine, HB Crescent Mine, and HB Eddy Mine. Portions of these four separate mining units would be individually flooded, using injection wells specific to each flood area. The underground pools would be formed from the injected brine that collects in low-lying areas of the mine, contained by a solid mine face or higher mine floor elevations. **Table 2-2** displays the proposed elevations and depths for the flood pools in each mine.

Table 2-2 Flood Pool Elevations and Depths

Mining Unit	Approximate Bottom Elevation (feet amsl[1])	Maximum Flood Elevation (feet amsl[1])	Maximum Pool Depth (feet)	Maximum Surface Area (acres)
HB Eddy	2,575	2,675	100	1,865
HB South	2,375	2,525	150	668
HB North	1,975	2,325	350	1674
HB Crescent	2,050	2,200	150	147

[1] amsl = above mean sea level.

Evaporation Ponds

The proposed evaporation pond system would be constructed on Intrepid's property in Section 2, T21S, R29E. The evaporation pond system would consist of a network of approximately 23 to 26 discrete, flat-bottomed, terraced, shallow ponds ranging from 16 to 26 acres in size, covering a combined area of approximately 520 acres, with an estimated total water surface area of 470 acres. Each pond would be designed to hold 2 feet of brine with 18 to 24 inches of freeboard to contain the brine plus precipitation. The ponds would be lined with a geosynthetic liner placed over graded, screened, and compacted subgrade material. The geosynthetic liner would then be covered with an 18-inch-thick layer of consolidated and hardened salt to provide a structural platform for the mechanical salt harvesting equipment to ensure that the integrity of the underlying synthetic liner would be maintained.

Surface water runoff would be kept out of the ponds by two diversion ditches on the southeast and west sides of the pond system. The diversion ditches would each be 4,000 feet long and 12 feet wide.

Pipeline System

All new pipelines would be black, ultraviolet-resistant high density polyethylene (HDPE) pipes that are extrusion-welded or joined with bolted flanges. These pipelines would be used to convey all fluids associated with the HB In-Situ Solution Mine Project except that coming from the Caprock well fields. The locations of the following pipelines are shown on **Figure 2-1**.

- Rustler Source Water Pipelines—14-inch-diameter pipe from the Rustler water supply wells to the new HB Mill area.
- Injectate Pipelines—14- to 16-inch-diameter pipe from the new HB Mill area to the injection wells.
- Pregnant Brine Pipelines—14- to 16-inch-diameter pipe from the extraction wells to the evaporation ponds.
- Dilution Lines—4- to 6-inch-diameter pipe from the existing Caprock fresh water line to the extraction wells.
- Harvested Slurry Pipelines—14- to 18-inch pipe from the evaporation pond system to the new HB Mill.
- Mill Recycled Make-Up Pipeline—8-inch-diameter pipe from the HB Mill to the evaporation pond slurry pit.
- Caprock Fresh Water Pipeline—Tap into the existing 6-inch line Caprock line that serves the Intrepid West Facility to supply fresh water to the HB Mill. This is an existing pipeline that carries Caprock water from existing wells to the east of the project area.

Wherever possible, the pipeline alignment would be located along existing roads and ROWs. The pipeline alignments would avoid steep slopes. Where multiple pipelines are present, the various pipes would be laid next to each other in a bundle. All pipelines would be pressure tested and all construction and testing procedures would follow standard engineering and industry protocols. The maximum flow rate generally would not exceed 2,000 gallons per minute (gpm). However, the pipelines from the extraction wells would be designed to carry a maximum flow rate of 3,200 gpm to allow for short-term high net evaporation periods when more pregnant brine can be handled in the evaporation ponds. Ideally, once the flood pools are filled and extraction of pregnant brine begins, the flow rates into and out of the flood pools would be equal.

New pipelines would be laid on the ground surface after it has been cleared of woody vegetation, with buried sections located approximately every 0.25 mile to enable wildlife, livestock, and vehicles to cross the obstructions. Small diameter instrumentation cable bundles would be shallowly buried underneath each pipeline. Pipeline burial would be implemented as shown in the typical cross-section in **Figure 2-2**, with variations for topography as needed. There would be six road crossings (four crossing NM 360 and two crossing U.S. 62/180 and the railroad) at which the pipelines would be installed in conduit bored under the roads or routed through an existing concrete channel under U.S. 62/180. Specific design characteristics regarding piping size, flow rates, and pressures are subject to final design modifications.

Other Associated Facilities

A maximum of eight lift/booster stations would be installed along the main pipeline to ensure that there is adequate pressure to pump long distances over varied slopes and to overcome friction loss in the pipes. Each booster station would include a pump house and power pole within a fenced area. Surge tanks may be included at each booster station. All designs would include check valves to account for anti-

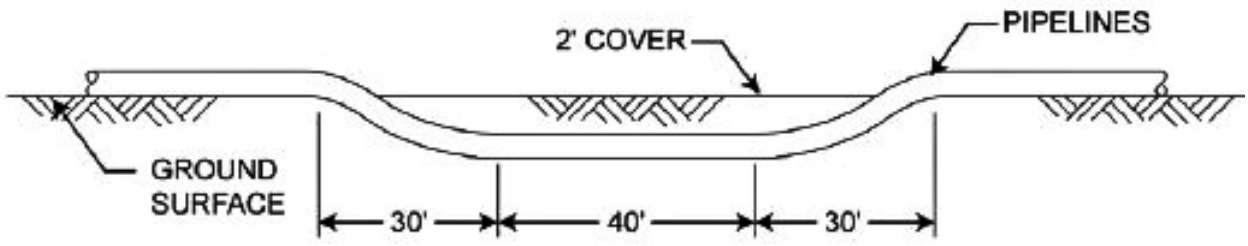

Figure 2-2. Typical Installation of Buried Pipe Section

backflow or siphon conditions and instrumentation to monitor pipeline performance and adjust interdependent flow rates and pressures.

Electric power would be supplied to the Rustler water supply wells, extraction wells, monitoring/extraction wells, and booster stations via overhead power lines, using existing lines and ROWs wherever possible. New power lines would be installed within the pipeline ROWs, with wooden poles spaced approximately 300 feet apart.

New access roads would be constructed along each pipeline within the 50-foot ROW to facilitate access for construction, operation, and maintenance. All roads would be cleared of vegetation and surfaced with gravel or caliche to maintain a 12-foot-wide running surface. To provide enough caliche (up to 93,600 cubic yards), up to six borrow pits would be used (see **Figure 2-1**). Two of these pits (#1 and #6) currently exist, and four new pits are proposed. One pit also would be a source for sand if needed to bed the pipes. All caliche pits would be on land managed by the BLM and would require BLM permits and site-specific approval before excavation can begin.

A road, approximately 2 miles long, from the evaporation ponds to the new HB Mill would be constructed for heavy equipment to haul salt to the ponds from the salt load-out pad adjacent to the existing West Mine Plant tailings pile. This is an existing road that would be widened, graded, and improved. The purpose of the salt haul road is to haul salt from the West Plant tailings area to the evaporation ponds where the salt would be used as protective cover over the pond geosynthetic liner. This haul road would be used for pond construction and as an access road during project operations.

The 50-foot-wide pipeline ROWs would total 38 miles in length. Half the width of the pipeline ROWs (25 feet) would be occupied by pipelines, and roads.

Within Section 2, T21S, R29E, three Xcel Energy overhead power lines with ROWs totaling 3.4 miles, two New Mexico Gas Company underground gas lines (1.8 miles), and one AT&T fiber optic line (0.6 mile) would require relocation prior to construction of the evaporation ponds. These lines would be relocated on Intrepid fee land, as shown on **Figure 2-1**.

2.4.2.2 In-Situ Solution Mining Process

This section describes the steps in the process as they would occur once all components are in place.

Groundwater Pumping and Conditioning of Injectate

Groundwater from the Rustler water supply wells would be pumped using submersible pumps, then transported through 14-inch pipelines from the production wells to the Groundwater Conditioning Unit at

the new HB Mill. Rustler water would be pumped at a maximum rate of 2,000 gpm and an average rate of 1,054 gpm. It is anticipated that the maximum pumping rates would occur during the initial filling phase (years 0 to 7) until the former mine workings are filled to the maximum pool elevations. During years 8 to 21, the average pumping rate (1,054 gpm) would be maintained, and during the final phase (years 22 to 28) no pumping from the Rustler wells would occur.

The Rustler groundwater would be conditioned by adding NaCl produced from two sources: the existing West Mine facility tailings and an NaCl brine stream from the new HB Mill. Prior to operation of the new HB Mill and during periods when the new HB Mill does not produce enough NaCl, NaCl would be obtained from the existing West Mine facility. After harvesting from the evaporation ponds begins, the NaCl tailings stream from the new mill would be used to condition the water for injectate. The injectate should be composed of approximately 24 percent NaCl, 1 percent KCl, 0.5 percent magnesium chloride, and 0.4 percent calcium sulfate.

Caprock water would be pumped and transported from Intrepid's Caprock well fields in Lea County for use in mill processing. Approximately 267 gpm would be needed for Phase I and 208 gpm for the remainder of the project.

Filling the Former Mine Workings

The conditioned injectate would be pumped to the six injection wells through pipes ranging from 12 to 16 inches in diameter. The injection wells would supply injectate to the four underground mine workings: HB Potash North, HB Potash South, HB Crescent, and HB Eddy. The maximum combined injection rate for the six injection wells is 2,000 gpm at pressures of up to 160 pounds per square inch (psi). The individual mine units would take from 1 to 70 months to fill, depending on applied pumping rates and flood pool size.

The ore dissolution process works by selectively dissolving and leaching potassium and magnesium chloride salts from the floors, pillar walls, and ceiling of the former underground mines where interconnected KCl is exposed to the injectate solution, producing the pregnant brine. In the ion-exchange process that occurs, sodium ions in the injectate are exchanged for potassium ions, creating the pregnant brine. The sodium ions replace the potassium ions in the pillars and walls to a thickness of up to 18 inches so the area of the pillars and walls in contact with the injectate does not completely dissolve.

The proposed flooding sequence would fill the HB Crescent Mine first followed by the other three underground mine areas. The HB Crescent underground mine workings would contain the smallest flood pool, estimated to be filled in within 1 month at maximum injection rates. This would allow dissolution to occur over the following 5 months and extraction to begin in the second half of the first year of the project. As each mining unit is filled, flow rates, injected volumes, flood pool elevations, and brine quality would be monitored and assessed. The actual timing of filling, dissolution periods, and extraction of pregnant brine depends on a variety of factors and decisions to be made by Intrepid once the project implementation begins.

When all the void spaces are filled to the maximum flood elevation levels, steady state conditions (equal injection and extraction rates) would be maintained until pregnant brine grade reaches a point that further injection is not economically beneficial. At that point, injection would be terminated and only extraction of the pregnant brine would occur.

The length of time to fill, dissolve the potash, extract the pregnant brine, and empty each mine flood pool would vary with the size of the flood pool. In general, there would be a filling period between 2 to 35 months long, depending on the mine. The ore dissolution time would range from 14 to 136 months; the period for equal injection/extraction rates would vary between 12 to 100 months; flood pool emptying time would range from 2 to 35 months long. Many of these activities would be concurrent within the 28-year project life.

Many factors, such as salt dissolution rates, blending requirements for conditioning, net evaporation rate variability, mechanical interruptions, and other operating factors would influence the actual injection and pumping schedules. Site-specific data analysis and process simulations have been used to design the dissolution process, plant capacity, and associated infrastructure, but actual produced brine chemistry would be used to make adjustments to facility operations once the project is underway.

Extracting and Transporting the Pregnant Brine

Once the pregnant brine reaches the optimal concentration of KCl, it would be extracted from the underground workings through a system of five extraction wells. The average combined rate of pumping from the flood pools using the 5 extraction wells would be 1,054 gpm.

The extracted pregnant brine would be transported to the evaporation ponds through the 14- to 16-inch-diameter pipelines. The maximum permitted discharge to the evaporation ponds is 4,608,000 gallons per day (gpd) or 3,200 gpm, which is equal to the maximum pipe design flows. The maximum extraction rate and transport of pregnant brine may occur during short periods of high net evaporation rates when climatic conditions are favorable.

Operation of the Evaporation Ponds

Once the pregnant brine extraction begins, the evaporation ponds would be continually filled using a piping manifold network. Portable pumps and siphons would be used to manage brine solutions within the ponds. Over time, evaporation would concentrate the brine to a point where the NaCl and KCl precipitate out as solids. During the steady state phase of the project (years 8 to 21) after the ponds are filled to maximum design elevations, the rate of flow to the evaporation ponds would equal the brine injection rate and the net evaporation rate.

After sufficient KCl has precipitated, selected ponds would be drained and the precipitated product would be harvested by a mechanical scraper. The solid product would be hauled to a slurry mixing facility within the evaporation pond system, where slurry would be created and pumped to the new HB Mill through a 14- to 18-inch-diameter pipeline. Each pond would be intensively managed and harvested approximately once per year. The magnesium chloride (MgCl) bitterns, a waste product, would be routed to other ponds for further evaporation.

Throughout this process, brine enriched with MgCl mixed with trace amounts of sulfate and other insoluble residuals (bitterns) would be produced as a by-product. The bitterns would be sequentially segregated and pumped into one of the lined ponds within the evaporation pond area, designated specifically for magnesium chloride storage or disposal. The magnesium-enriched brine stream within the evaporation pond system would be transferred using moveable, HDPE pipelines and a trailer-mounted pump. The amount of magnesium-enriched brine generated at full build-out of the evaporation pond facility is estimated to be less than 20 gpm of combined flow. Intrepid plans to treat the bittern by-product stream into a commercial magnesium product as market conditions allow. If treating and selling this product is unsuccessful, the MgCl bitterns may be returned to the underground mine workings.

Processing at the New HB Mill

The ore harvested from the evaporation ponds would be pumped through a 14- to 18-inch pipeline in slurry form to the new HB Mill for further treatment. The mill would operate for 355 days per year. The KCl and NaCl would be separated in the flotation mill using an amine flotation process, then classified and filtered to finally render a refined potash cake with a 4 to 7 percent moisture content. This product would be conveyed to a dryer system at the existing Intrepid Potash North Plant where the product would be prepared for market.

The NaCl byproduct generated in the flotation process would be recycled and piped to the Groundwater Conditioning Unit to be mixed with Rustler groundwater for preparation of the brine injectate. Any excess

NaCl byproduct not needed to condition injectate would be stored on a lined, temporary salt holding pad at the new HB Mill and then sold. If the salt were unable to be sold, it would be reinjected back into the HB inactive mine workings.

During initial filling, and periods when sufficient quantities of salt are not available from the new HB Mill, tailings produced from the existing Intrepid West facility would be used to condition the injectate solution.

Fresh Caprock water would be used to flush valves, prepare reagents, dilute flotation reagents, support scrubber operations, function as cooling water, and for other in-mill needs. This water would be supplied from an existing permitted source owned by Intrepid. After the fresh Caprock water is used in the new HB Mill, it would be recycled and used to create the slurry at the evaporation ponds, to supplement evaporation pond water, or to supplement injectate water. During the first seven years, up to 267 gpm of Caprock water would be used. During average, steady state mill operations, the Caprock water use is expected to be approximately 208 gpm.

Construction Sequence

The following activities are proposed to be performed, beginning in the order listed, assuming overlap of activities in order to complete all construction within 1.5 years.

1. Relocation of utilities at pond location (power lines, gas lines, fiber optic line)—6 months
2. Earthmoving and installation of facilities for evaporation pond system—15 months
3. Construct HB Mill—15 months
4. Drill wells—6 months
5. Construct pipelines—9 months
6. Install power and other infrastructure for wells and HB Mill—15 months

Flooding and Extraction Sequence

Injection rates are proposed to be approximately 2,000 gpm during initial filling of all mines. Once the flood pools are full, the average injection rate would be approximately 1,054 gpm. The phases and injection and extraction rates are summarized below.

- Phase I: Initial Phase
  - Injection at Maximum Rate (2,000 gpm)—Years 0 – 7
  - No Extraction Years 0 – 0.5
  - Extraction at Average Rate (1,054 gpm)—Years 0.5 – 7
- Phase II: Steady State Phase
  - Injection at Average Rate (1,054 gpm)—Years 8 – 21
  - Extraction at Average Rate (1,054 gpm)—Years 8 – 21
- Phase III: Final Extraction Only Phase
  - No Injection Years 22 – 28
  - Extraction at Average Rate (1,054 gpm)—Years 22 – 28

Summary of Proposed Action

The Proposed Action is estimated to generate approximately 185,000 tons of potash per year once steady state operations (Phase II) are achieved. For construction, it is estimated that a maximum of 274 workers would be employed for at least 3 months, and up to 263 workers would be employed during

the second year. During the operations phase, Intrepid would employ 36 workers for the life of the project in addition to its existing work force. The new employees would be hired a few months prior to the initiation of project operations to ensure that they are adequately trained.

Tables 2-3, **2-4**, and **2-5** summarize the projected amount of surface disturbance, amount of new facilities to be constructed and maintained, and the water usage projected under the Proposed Action. Long-term disturbance includes areas that are altered from the native state, and may include areas that are covered with concrete or structures, or bare ground. The acreage of long-term disturbance excludes the areas of initial disturbance that have been reclaimed.

Table 2-3 Surface Disturbance under Proposed Action

Facility	Quantity	Initial Disturbance (acres)	Long-term Disturbance (acres)
New Wells (no.)	21	10	1
Evaporation Ponds (no.)	26	574	522
Diversion Ditches (no.)	2	4	2
Power Lines (mi.)	38	11	0
Lift/Booster Stations (no.)	8	7	2
HB Mill (no.)	1	10	5
New Roads (mi.)	38	82	55
Pipeline burial locations (approx. no.)	151	4	0
Pipeline ROWs (includes roads, pipes, power lines, booster stations) (mi.)	38	229	114
Rerouted Utility ROWs (mi.)	6	42	7
Salt Haul Road (mi.)	2	8	6
Caliche Pits (no.)	6	174	174
Total Disturbance[1]	**—**	**1,022**	**829**

[1] This is not a sum of the acreage for the facilities listed above because it excludes any overlapping areas, such as where there are well pads within the evaporation pond areas or where the roads occur within the pipeline ROWs.

Table 2-4 Length of Pipeline by Diameter under Alternative A

Pipeline Diameter (inches)	Total Length (miles)
6	24
8	2
14	24
16	30
18	2
Total	**82**

Note: Pipelines listed would be grouped within the 38 miles of 50-foot-wide ROWs.

Table 2-5 Summary of Water Usage under Proposed Action

Water Type/Use	Maximum Water Usage					
	Phase I		Phase II		Phase III	
	afy	gpm	afy	gpm	afy	gpm
Rustler Water for Injectate	3,226	2,000	1,700	1,054	0	0
Caprock Water	431	267	336	208	336	208

Notes:

afy = acre-feet per year (1 acre-foot of water equals 325,581.4 gallons).

Phase I = Years 0 – 7; Phase II = Years 8 – 21; Phase III = Years 22 – 28.

2.4.3 Alternative B—Supplemental Water Sources

Alternative B would include all of the facilities, processes as described for Alternative A, Proposed Action, with the exception of the northernmost Rustler wells and pipelines, which would not be included under this alternative (see **Figure 2-3**). It would include approval of lease modifications described for the Proposed Action. Due to public and agency concerns related to whether there would be enough Rustler water to fill the flood pools in the inactive workings, this alternative incorporates the increased use of Caprock water as a supplemental or primary water source. The northernmost Rustler wells included in Alternative A were not included in this alternative due to concerns over high lead levels that may affect the quality of the potash produced without extensive water treatment prior to injection into the flood pools.

Caprock water from Intrepid's existing wells east of the project area (shown on **Figure 2-4**) would be used whenever the Rustler water supply is inadequate to meet the optimum filling rate of the flood pools. The quantity of Caprock water used would range from approximately 200 gpm to 2,000 gpm in addition to the 208 gpm to 267 gpm of Caprock water to be used for mill processes. Caprock water usage would not exceed Intrepid's existing water rights. Intrepid's water rights appropriation from the State Engineer for the East and HB Caprock well fields is over 7,700 acre-feet, which exceeds the annual maximum proposed Caprock water needs by over 3,200 acre-feet.

There are two existing pipelines from the Caprock well fields with a total length of approximately 66 miles. The following descriptions of these pipelines were derived from an engineering evaluation provided in a memorandum to Intrepid on August 27, 2010 (Ausenco Pipeline Systems Inc. 2010).

- The East Caprock pipeline (the southern Caprock pipeline shown on **Figure 2-4**) is 14-inch inside diameter, cement-lined, and coated with spiral-wound steel that is currently in use to supply approximately 1,400 gpm to Intrepid's East Plant. This pipeline is in fairly good condition with a maximum capacity of approximately 2,200 gpm.
- The HB/Eddy Caprock pipeline (the northern Caprock pipeline shown on **Figure 2-4**) is believed to be a spiral-welded steel pipe with a concrete external coating (no cement lining). This pipeline is approximately 12 inches (inside diameter) and is known to be in poor condition. The maximum capacity is estimated to be 1,000 to 1,400 gpm.

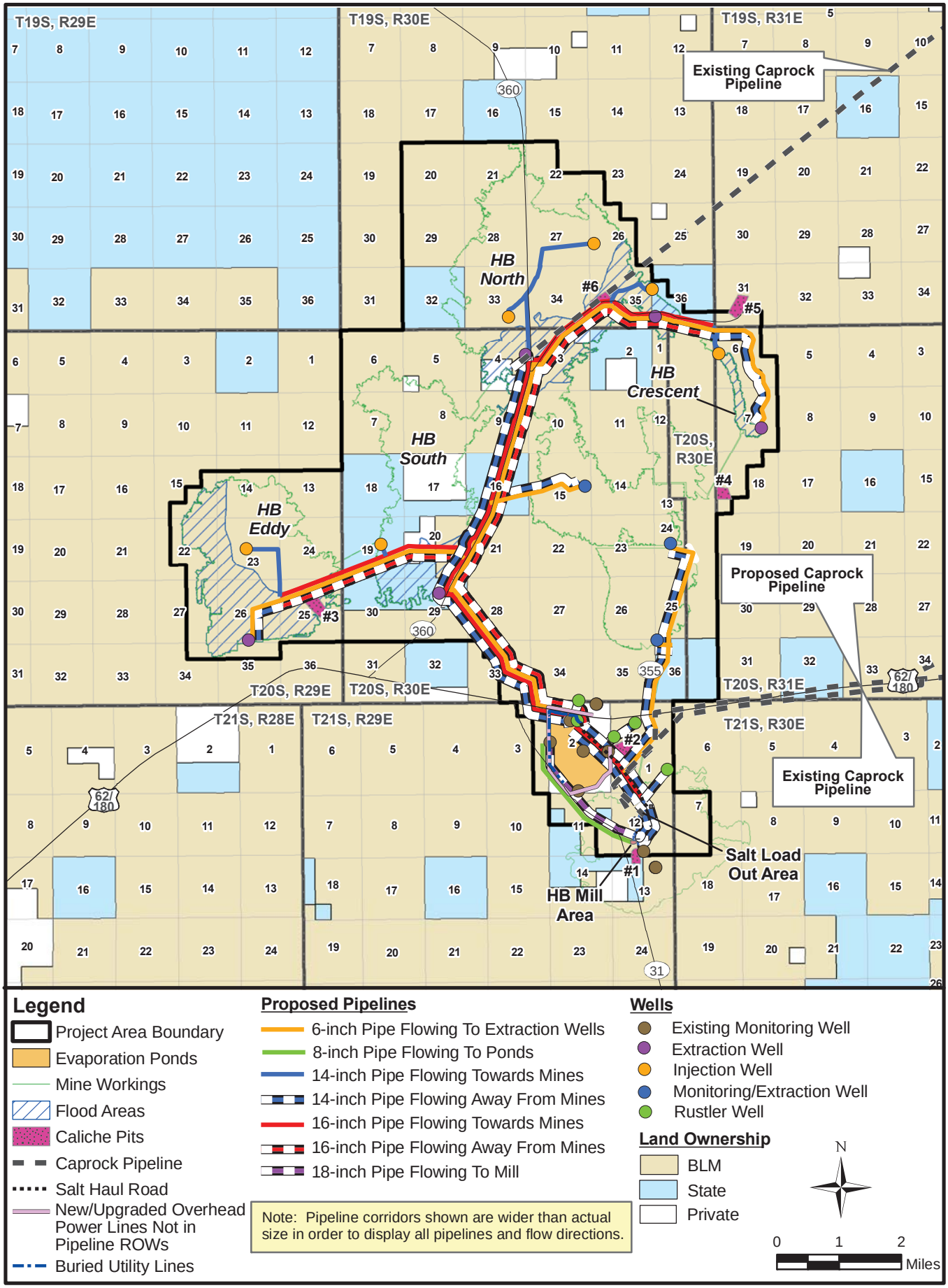

Figure 2-3 Alternative B Infrastructure Layout in Project Area

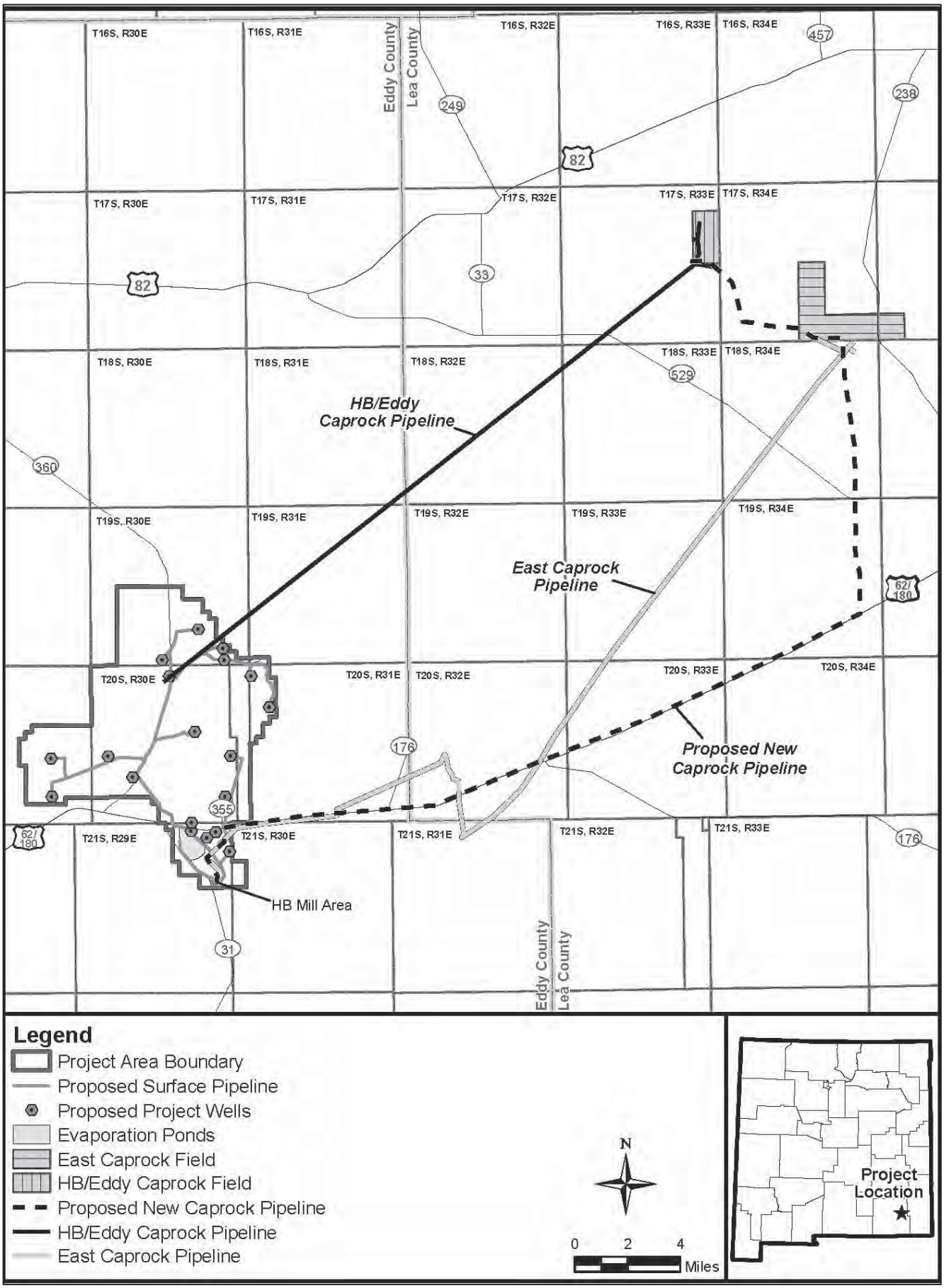

Figure 2-4 Preferred Alternative Infrastructure Layout in Project Area under Alternative B

The reliability and capacity of the Caprock pipelines would be improved by implementing one of the following possible options:

1. Inserting HDPE smooth pipe into the existing concrete pipelines (East Caprock pipeline and HB/Eddy Caprock pipeline) to increase the rate of flow by reducing friction loss. This would require excavation of the concrete pipeline approximately every quarter mile.
2. Replacing the existing buried concrete Caprock main pipelines with new HDPE pipe alongside the existing concrete lines and within the same ROWs. This would require excavation of the entire main pipeline and placement of a new line parallel to the existing line in the same ditch.
3. Installing a single new Caprock pipeline that would be designed to convey all water (maximum of 5,000 gpm) from Intrepid's four Caprock well fields in Lea County to any Intrepid facility, including the North, East, and West plants, and the new HB mill. This pipeline route, shown on **Figure 2-4**, would be buried in a trench at least 30 inches deep within a new ROW that heads south from the Caprock well fields, then parallel to NM 62/180 on the north side of the road until it enters the project area. The new pipeline would be constructed of HDPE, steel, or a combination of the two materials with pipeline diameters up to 36 inches. A 2- to 4-inch-diameter pipeline for control wiring would be installed in the trench next to the water pipeline. A 12- to 15-foot-wide access road would be established and maintained along the pipeline to facilitate monitoring and maintenance activities.

For the purposes of this EIS analysis, it is assumed that either options 2 or 3 above would be implemented. Either option would involve establishment and maintenance of a 50-foot-wide ROW that would be cleared of vegetation prior to excavation. The disturbed soil would be graded and revegetated immediately following backfilling.

Large amounts of salt would be required to condition the fresh Caprock water before injecting it into the flood pools. The NaCl byproduct generated in the flotation process at the new HB Mill and salt from tailings produced by the existing Intrepid West Plant would be added to the Caprock source water to condition the injectate. Because great quantities of NaCl would be needed to create brine from fresh water, little or no NaCl byproduct would be available for sale or reinjection until Phase III of the project when no injectate would be needed. Differences in pipeline type and length, compared to the Proposed Action include the following:

- 14-inch-diameter pipeline from the northernmost Rustler wells has been eliminated.
- 14-inch-diameter pipeline from the end of the northern Caprock pipeline to the HB Mill has been added. This makes a bundle of four pipelines along the main pipeline ROW and adds 9 miles to the total pipeline length within the project area.

Table 2-6 summarizes the length of each pipe diameter within the project area under Alternative B, excluding the Caprock pipelines. **Table 2-7** summarizes projected surface disturbance.

In addition to the projected acres of surface disturbance described under the Proposed Action, there would be approximately 400 acres of initial surface disturbance to install new HDPE pipe within the existing Caprock pipeline ROWs. All disturbed areas would be reclaimed and revegetated after initial disturbance.

Table 2-6 Length of Pipeline by Diameter under Alternative B (within Project Area)

Pipeline Diameter (inches)	Total Length (miles)	Difference from Proposed Action (miles)
6	24	0
8	2	0
14	33	+9
16	30	0
18	2	0
Total	**91**	**+9**

Note: Pipelines listed would be grouped within the 37 miles of 50-foot-wide ROWs within project area. Excludes Caprock pipelines.

Table 2-7 Surface Disturbance under Alternative B

Facility	Quantity	Initial Disturbance (acres)	Long-term Disturbance (acres)
New Wells (no.)	18	8	1
Ponds (no.)	26	574	522
Diversion Ditches (no.)	2	4	2
Lift/Booster Stations (no.)	8	7	2
HB Mill (no.)	1	10	5
New Roads (mi.)	37	81	54
Pipeline burial locations (approx. no.)	149	4	0
Pipeline ROWs in project area (includes roads, pipes, power lines, booster stations) (mi.)	37	226	113
Rerouted Utility ROWs (mi.)	6	42	7
Salt Haul Road (mi.)	2	8	6
Caliche Pits (no.)	6	174	174
Existing Caprock Pipeline replacement (mi.)	66	400[1]	0
New Caprock Pipeline (mi.)[2]	46	279[2]	84
Total Maximum Surface Disturbance[3] (ac.)	**—**	**1,435[4]**	**914[5]**
Difference from Proposed Action (ac.)		**+413**	**+85**

[1] Maximum acreage of disturbance for Caprock pipelines.

[2] Acreage of new Caprock pipeline ROW; not included in total acreage of surface disturbance because it is less than the maximum under this alternative.

[3] This is not a sum of the acreage for the facilities listed above because it excludes any overlapping areas, such as where there are wells within the evaporation pond areas or where the roads occur within the pipeline ROWs.

[4] Total within project area boundary is 1,022 acres.

[5] Includes access road along new Caprock pipeline.

A primary difference between Alternative B and the Proposed Action is the increased use of Caprock water to supplement the saline water from the Rustler wells to ensure adequate continuous supplies of water to fill the flood pools. **Table 2-8** summarizes the maximum volume of Rustler and Caprock water to be analyzed under this alternative. The maximum total water usage of 2,267 gpm would not be exceeded at any one time. That maximum total water usage may be supplied by Caprock water, Rustler water, or any combination of the two sources up to the maximums listed in the table.

Table 2-8 Summary of Maximum Water Usage under Alternative B

Water Type/Use	Maximum Water Usage					
	Phase I		Phase II		Phase III	
	afy	gpm	afy	gpm	afy	gpm
Rustler Water for Injectate	1,242	770	1,242	770	0	0
Caprock Water	3,226	2,000	1,700	1,054	336	208

Notes:

1 acre-foot of water equals 325,581.4 gallons.

Phase I = Years 0 – 7; Phase II = Years 8 – 21; Phase III = Years 22 – 28.

2.4.4 Alternative C—Buried Pipelines

This alternative would approve Intrepid's mine operation plan, grant ROWs with modifications designed to limit surface facilities, and approve lease modifications. All pipelines would be buried within the pipeline ROW. The layout of the pipeline system and the proposed pumping of groundwater from Rustler Formation wells in the project area would be the same as that described for Alternative A, Proposed Action. More excavation would be required but the total acreage of surface disturbance would be the same as that described for the Proposed Action due to the clearing of vegetation and grading required within the ROWs under Alternative C. Vegetation disturbed for installation of pipelines in the project area would be reestablished, but the access roads would be constructed and maintained in the pipeline ROWs for monitoring. There would be less long-term bare ground and no surface pipelines, but all other aspects of the implementing the Proposed Action would be the same.

2.4.5 Alternative D—Preferred Alternative

According to CEQ's NEPA regulations at 40 CFR Section 1502.14(e), the agency's preferred alternative should be identified in the Final EIS. The BLM selected aspects of Alternatives B and C to be included in the Preferred Alternative. This alternative includes approval of Intrepid's revised HB In-Situ Solution Mine Operation and Closure Plan, granting new ROWs, approval of lease modifications, and approval of permits to drill new water supply, injection, extraction, and monitoring wells. All of the process plans would be the same as described for Alternative A—Proposed Action but there would be some adjustments to the construction schedule. In general, the construction schedule would take two years. Utility relocation and installation of the wells and pipelines in the project area would begin in the first quarter following project approval, followed by construction of the evaporation ponds, construction of the power infrastructure, then the HB Mill.

Under the Preferred Alternative, the BLM would modify 12,867 acres of Intrepid's potash leases to be classified as solution mining leases instead of conventional mining leases. This change would exclude all leases that touch the flood area from the 96,000-acre cap under 43 CFR §3503.37, as amended. Approval of this lease modification is justified because the leases containing the flood pools could not be used for conventional mining in the future.

Under this alternative, four Rustler wells would be drilled within Sections 1 and 2 of T21S, R29E, to the north and east of the proposed evaporation ponds. To avoid karst features, the surface pipelines over the HB Eddy inactive workings have been slightly rerouted compared to the Proposed Action layout. Due to new information on pipe design and power company requirements for efficient delivery of electricity to the project components, other adjustments to the layout of the pipeline bundles within the project area are considered under the Preferred Alternative that are slightly different than the layout originally proposed as part of the Proposed Action and Alternatives B and C. See **Figure 2-5** for the revised pipeline layout.

There would be 18 evaporation ponds covering 584 acres, fewer ponds and a larger total footprint than that described under the Proposed Action, to improve capabilities for managing brine concentrations and salt deposits. Existing utilities (gas line, fiber optic cable, and power lines) would be moved from current locations within the boundaries of the proposed ponds to ROWs around the ponds. The expanded evaporation pond area and rerouted utility ROWs are displayed on **Figure 2-5**.

Next to the evaporation ponds and caliche pit #2, a stockpile area would be established to store the top 6 inches of soil stripped from the pond area at the start of construction. This stockpile area would cover 21 acres with earthen berms constructed on the outside of the stockpile to keep out surface water runoff and minimize offsite sedimentation from the stockpile. The topsoil stockpile would be approximately 15 feet high with a flat top and side slopes constructed at a ratio of 2:1. All bare soil in the stockpile area would be revegetated and would remain undisturbed until completion of the project when it would be used for final reclamation.

Within the project area, approximately 68 percent of the pipeline bundles would be buried for a variety of reasons, including minimizing barriers to wildlife and livestock movements, preventing obstruction of off-highway vehicle (OHV) traffic by surface pipelines to improve public safety, minimizing limits to future trail development in the vicinity of Hackberry Special Recreation Management Area (SRMA), and minimizing obstruction of surface water flow in drainages. Where pipeline bundles would be located within or adjacent to other disturbed areas such as the evaporation ponds, fencelines, and roads, the pipes would be permitted to be installed on the surface. Where long pipeline bundles are installed on the surface, segments would still be buried as described under the Proposed Action. The locations where the pipeline bundles within the project area would be buried and on the surface are displayed in **Figure 2-6**. Additional monitoring equipment and valves may be necessary to improve monitoring of buried pipelines.

Under the Preferred Alternative, additional water from Intrepid's Caprock wells east of the project area would be used to supplement the saline water whenever the Rustler water supply is inadequate to meet the optimum filling rate of the flood pools. The quantities and timing of using Caprock and Rustler water would be the same as described under Alternative B.

The route of the new Caprock pipeline under Alternative B (see **Figure 2-4**) has been slightly modified to minimize impacts to sand dune lizards, shown on **Figure 2-7**. This pipeline would be designed to convey all water (maximum of 5,000 gpm) from Intrepid's Caprock well fields in Lea County to any Intrepid facility, including the North, East, and West plants, and the new HB mill. It would be constructed of HDPE, steel, or a combination of the two materials up to 36 inches in diameter. A 2- to 4-inch-diameter pipeline for control wiring would be installed in the trench next to the water pipeline. The Caprock pipeline bundle would be buried in a trench with at least 30 inches of cover within a new ROW. A 12- to 15-foot-wide access road would be established and maintained along the pipeline to facilitate monitoring and maintenance activities.

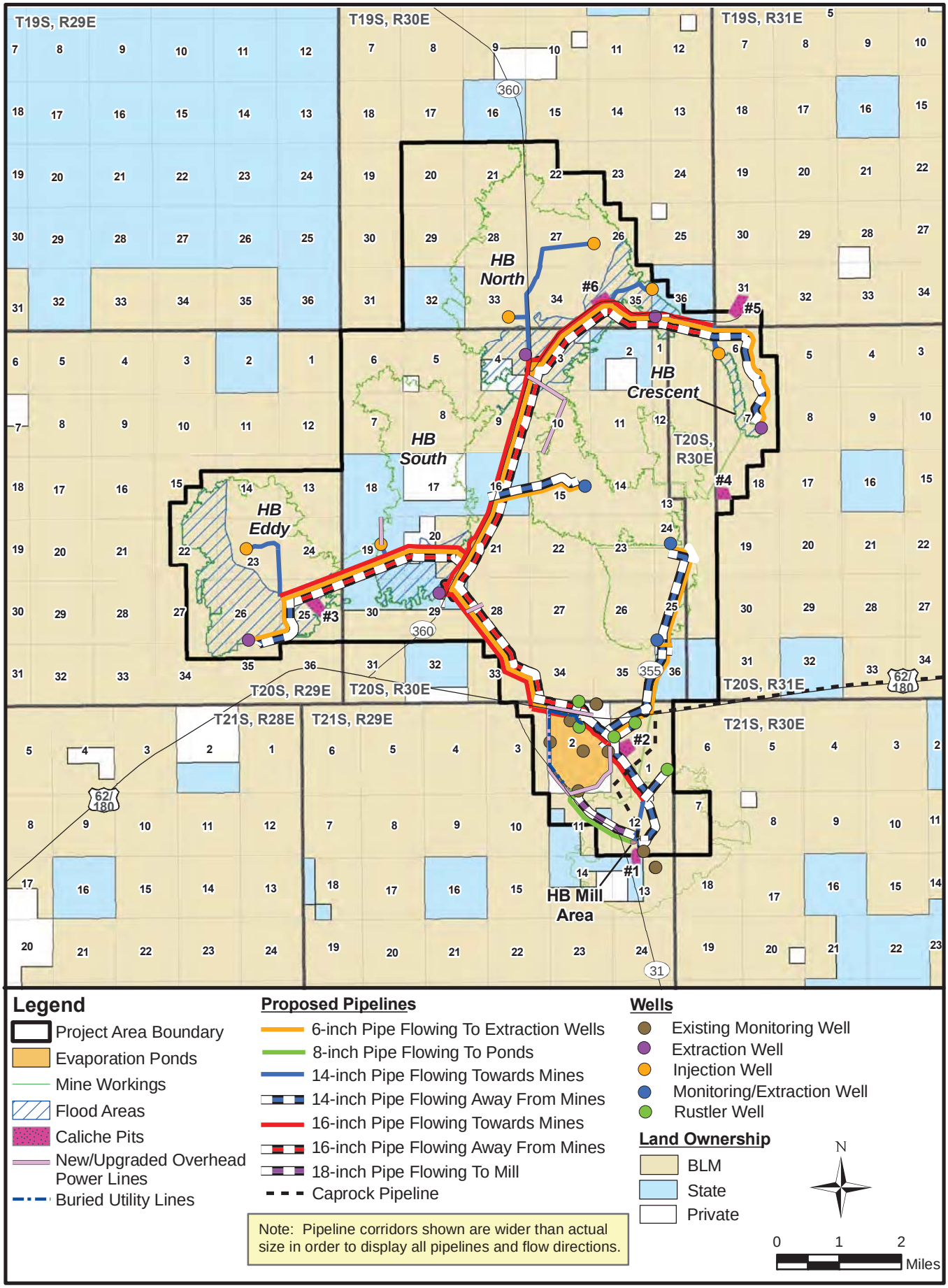

Figure 2-5 Preferred Alternative Infrastructure Layout in Project Area

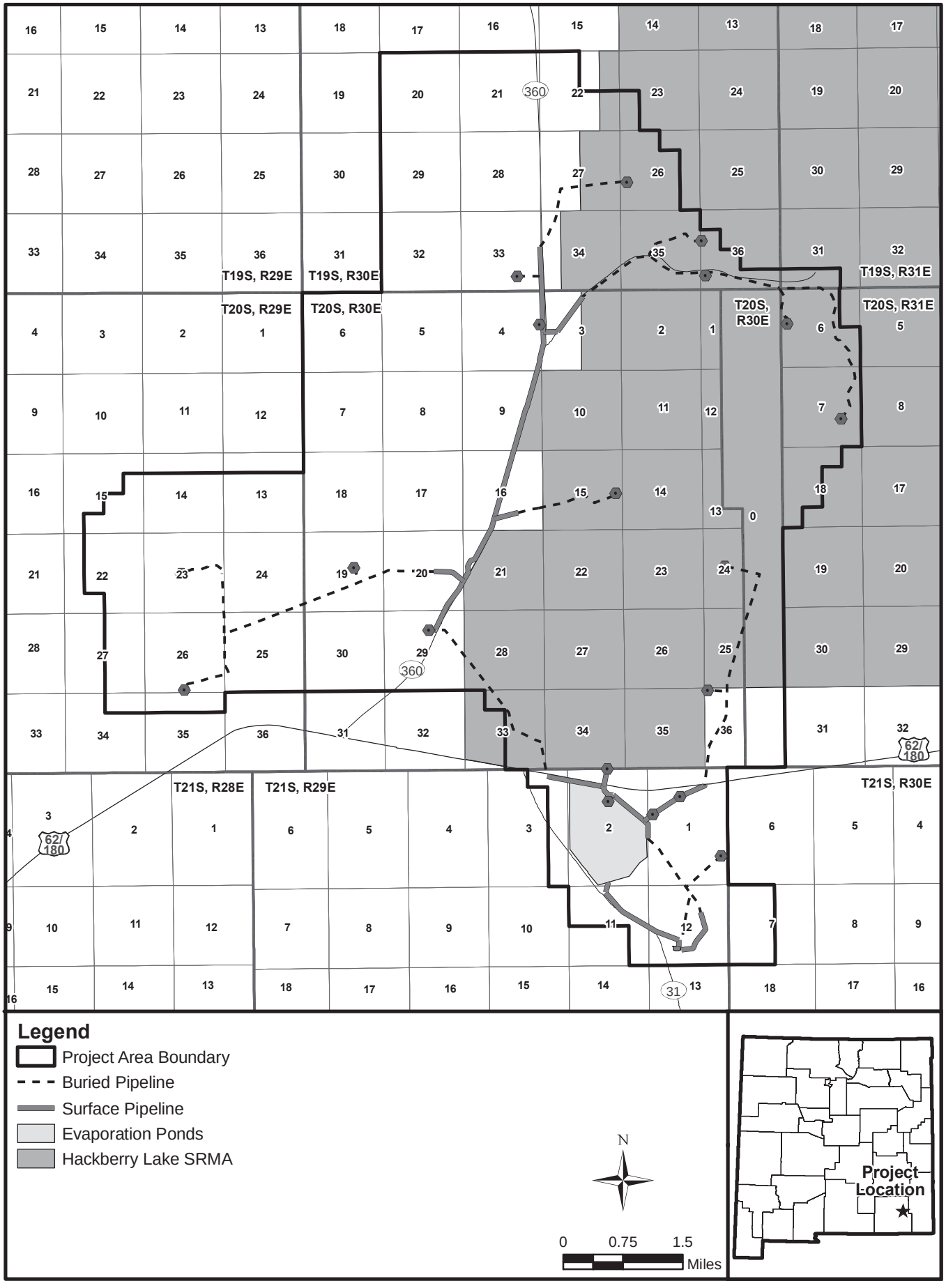

Figure 2-6 Surface and Buried Pipelines in Project Area under Preferred Alternative

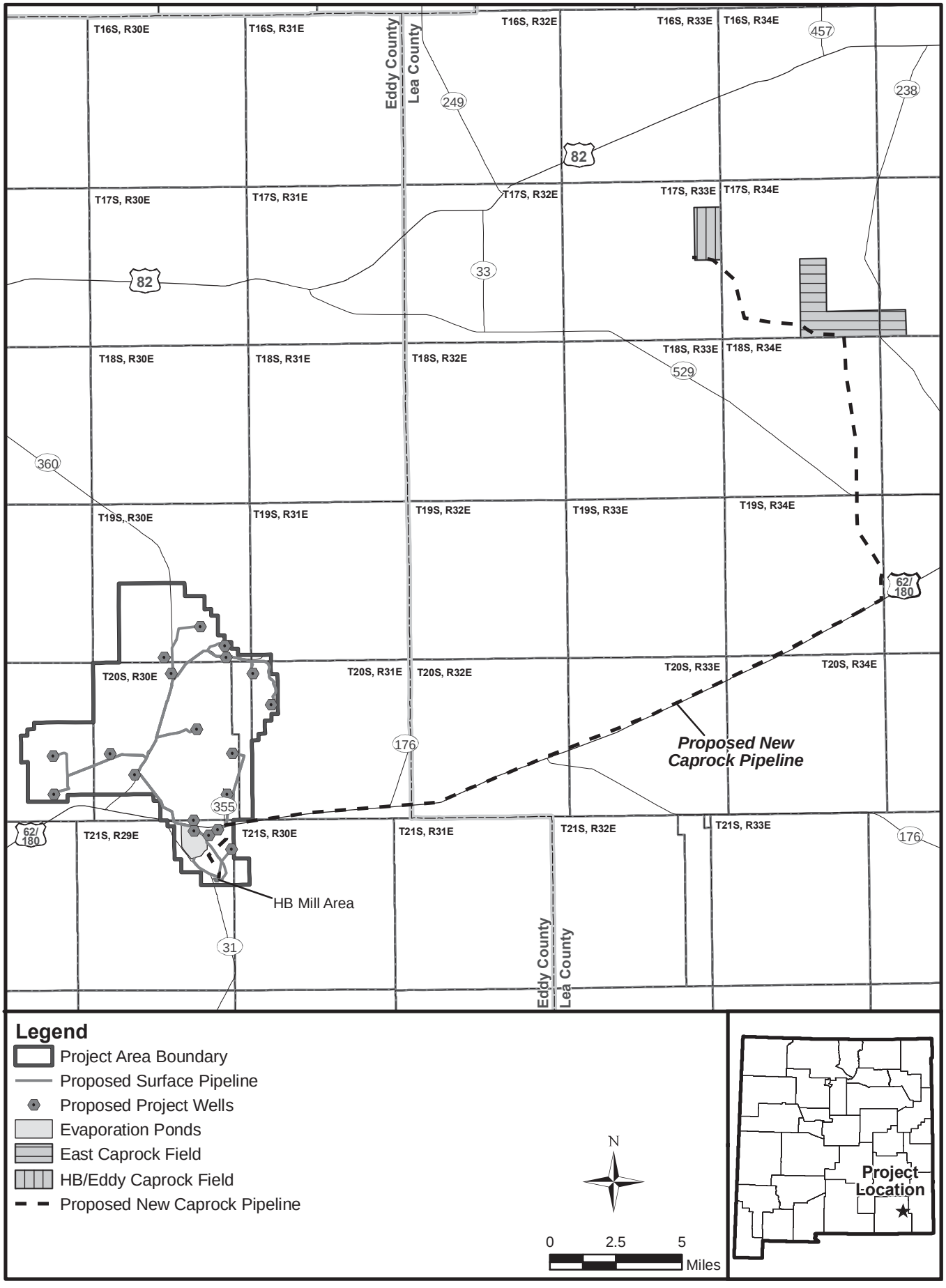

Figure 2-7 Caprock Pipeline under Preferred Alternative

Coordination and planning between Intrepid and the two power providers (Xcel Energy and Central Valley Electric Cooperative [CVEC]) since the Proposed Action was presented to the public and the Draft EIS was published resulted in the changes to the original power distribution system in the project area that are incorporated into the Preferred Alternative. Where Intrepid is responsible for running power to project facilities, the power lines would be located within the pipeline ROWs as described under the Proposed Action. In order to connect with existing power lines operated by Xcel or CVEC, some new or upgraded lines would be constructed outside the pipeline ROWs. The proposed new and upgraded power lines are displayed on **Figure 2-5**. The segments displayed are shown as disconnected segments because they connect at each end to existing lines. The new and upgraded power lines would be constructed on poles from 40 to 45 feet high with spans ranging from 250 to 350 feet between poles. ROWs for new and upgraded power lines up to 30-feet wide would be bladed, then revegetated. To facilitate inspection and maintenance, a natural surface, two-track road would be established and maintained along all power lines not within pipeline ROWs. All new and upgraded transmission lines would be constructed with raptor protection.

2.4.5.1 Construction Sequence and Workers

The following construction sequence is proposed under the Preferred Alternative, beginning in the order listed, assuming overlap of activities in order to complete all construction over a 20- to 24-month period. It varies slightly from that described under Alternative A, Proposed Action.

1. Relocation of utilities at pond location (power lines, gas lines, fiber optic line)—up to 6 months
2. Earthmoving and installation of facilities for evaporation pond system—15 to 18 months
3. Construct HB Mill—15 to 18 months
4. Drill wells—6 to 9 months
5. Construct pipelines—up to 9 months
6. Install power and other infrastructure for wells and HB Mill—15 to 18 months

It is estimated that a peak of 272 workers would be employed for the construction phase, averaging about 155 workers over the entire construction schedule.

2.4.5.2 Surface Disturbance

A summary of the extent of initial surface disturbance and long-term disturbance under the Preferred Alternative is provided in **Table 2-9**. A breakdown of the pipelines proposed to be installed within the project area by diameter is provided in **Table 2-10**.

Table 2-9 Surface Disturbance under the Preferred Alternative

Facility	Quantity	Initial Disturbance (acres)	Long-term Disturbance (acres)
New Wells (no.)	18	8	1
Ponds (no.)	18	584	584
Topsoil Stockpile (ac.)	21	21	0
Diversion Ditches (no.)	2	4	2
Lift/Booster Stations (no.)	8	7	2
HB Mill (no.)	1	10	5
New Roads in Project Area (mi.)	35	76	54
New Pipeline ROWs in project area (includes roads, pipes, power lines,	35	212	68

Table 2-9 Surface Disturbance under the Preferred Alternative

Facility	Quantity	Initial Disturbance (acres)	Long-term Disturbance (acres)
booster stations) (mi.)			
Rerouted Utility ROWs (mi.)	6	42	7
New and Upgraded Power line ROWs (includes access roads) (mi.)			
Caliche Pits (no.)	6	174	174
New Caprock Pipeline (mi.)	47	285	85[3]
Total Maximum Surface Disturbance[1] (ac.)	**—**	**1,331[2]**	**962[2]**
Difference from Proposed Action (ac.)		**+309**	**+133**

[1] This is not a sum of the acreage for the facilities listed above because it excludes any overlapping areas, such as where there are wells within the evaporation pond areas or where the roads occur within the pipeline ROWs.

[2] Totals within project area boundary are 1,071 acres initial disturbance and 882 acres long-term disturbance.

[3] Includes access road along new Caprock pipeline.

Table 2-10 Length of Pipeline in Project Area by Diameter under Preferred Alternative

Pipeline Diameter (inches)	Total Length (miles)
6	24
8	1
14	19
16	30
18	1
Total	75

Note: Pipelines listed would be grouped in bundles within the 35 miles of 50-foot-wide ROWs.

2.4.6 Environmental Protection Measures Common to All Alternatives

Intrepid would adhere to all lease conditions, in addition to all relevant federal and state laws, regulations, and policies under all alternatives. Additional environmental protection and mitigation measures may be identified during the EIS process. The following measures would be implemented, as needed depending on site-specific conditions, under any of the action alternatives to protect the human environment.

Other Federal Permits and Requirements

- NPDES Construction General Permit—where 1 acre or more of land is disturbed, this permit, implemented by the U.S. Environmental Protection Agency (USEPA), requires the development and implementation of storm water pollution prevention plans (SWPPPs) to prevent sediment and other pollutants from being discharged in storm water runoff. Implementation includes establishment of erosion and sediment controls, temporary and permanent soil stabilization, storm water control structures, measures to keep construction sites clean.

- Consultation with the USFWS under the ESA—assess whether the proposed activities would jeopardize the existence of endangered or threatened species or their critical habitat.
- NHPA and Executive Order (EO) 13175, and other laws pertaining to tribal coordination and management of cultural resources—identify and mitigate impacts to cultural resources that may be affected by proposed project and coordinate with tribes and pueblos that have an interest in the area.
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations—evaluate the potential for impacts to minority and low-income populations.
- Safe Drinking Water Act, Part C (42 USC 300h et seq.) —regulates the installation and management of underground injection control wells and is managed by the New Mexico Environment Department (NMED).

State Permits and Requirements

- Discharge Permit under the New Mexico Water Quality Act, Groundwater and Surface Water Protection (20.6.2 NMAC regulations)—control the discharges of water contaminants from the injection wells, extraction wells, evaporation ponds, potash processing mill, and brine management facility into groundwater and surface water under the terms and conditions of this permit issued by NMED, Water Quality Bureau.
- Construction and Operating Permits under the New Mexico Air Quality Control Act and regulations (20 NMAC 2.72)—control the emission of criteria pollutants (such as nitrogen oxides [NO_X] and carbon monoxide [CO]) that exceed designated limits under the terms and conditions of permits issued by NMED, Air Quality Bureau.
- ROW Easement approval on New Mexico State Land—ROWs on state land must be approved for pipelines, roads, and power lines. The terms and conditions of the granted ROW require that the operator preserve and protect the natural environmental conditions of the land, including reclamation of disturbed areas and revegetation. Roads must meet specific state standards.
- Archaeological Permit under the Cultural Properties Act (Section 18-6-9 NMSA 1978, as amended)—archaeological field surveys to be completed prior to issuance of ROW on state land or earthmoving where there are archaeological sites on state land and privately owned land in New Mexico.

Applicant-committed Environmental Protection Measures

- A subsidence monitoring plan would be finalized and implemented by Intrepid to identify and evaluate any land subsidence in the project area. Monitoring points have already been established with BLM approval, and these locations would be surveyed prior to groundwater extraction and flood pool filling in order to establish baseline values for ground surface elevations.
- A groundwater monitoring plan would be developed by Intrepid and approved by the BLM prior to project implementation. The monitoring plan would describe how the monitoring wells would be operated to evaluate groundwater drawdown and the process for managing water usage as water levels in the wells and groundwater levels vary. Monitoring wells also would be used to identify potential depletions of existing springs, wells, and other water bodies that may result from project pumping.

- Siting of facilities would be completed in coordination with BLM resource specialists to ensure that adverse impacts to significant natural and cultural resources are avoided or otherwise mitigated.
  - All facilities would be monitored on a regular basis and controlled through regular field inspection and the use of automated sensing and shutdown equipment at strategic locations to minimize the potential for discharges or leaks. All monitoring, spill response, and remedial actions would comply with the items described in detail in Intrepid's HB In-Situ Solution Mine Operations and Closure Plan submitted to the BLM.
- Rustler production wells
  - Well pads would be fenced to exclude access by people or animals.
  - Work surface would be stabilized with concrete or caliche.
  - Area surrounding well pads would be bermed to contain any spills and to protect well casing integrity.
  - Backflow preventers would be installed to protect well integrity.
- Injection and extraction wells
  - Well management would be subject to terms and conditions of the NMED Discharge Permit.
  - Well casings would be constructed to exceed Class III well standards. Casing materials would be designed to function in a highly saline environment.
  - Well annular space and column pressure-sensing equipment would be installed.
  - Well pads would be fenced to exclude access by people or animals.
  - Work surface would be stabilized with concrete.
  - Automated monitoring system would be installed to support operations and maintain underground workings flood elevations.
- New monitoring/extraction wells
  - Wells would be sited and designed to detect the presence of underground brine flowing from the flooded mine workings.
  - Each of the three wells would be equipped with automated monitoring systems to detect and report any brines outside the flooded mine workings.
  - Each well would be equipped with the equipment (pumps, power, pipelines, etc.) needed to extract brine that migrates outside the flood pools to prevent a structural or safety problem.
  - In the event that a monitoring well detects brine outside the flooded workings, these wells would act as a safeguard by detecting and extracting "escaped" brine.
- All automated processes would be inspected, calibrated, and verified based on a regular inspection schedule to be established through a field operation and maintenance plan.
- Pipelines
  - Pipelines would avoid steep slopes.
  - Where pipelines must cross major roadways, the pipe would be installed by boring under the road to minimize traffic disruption.
  - Wherever possible, pipeline ROWs would be located along existing roads or other ROWs to limit surface impacts to already disturbed areas.
  - Automated sensing and shutdown equipment would be installed along the pipelines to minimize the potential for discharges or leaks of the transported brines.

  - The pipelines would be inspected regularly in the field. All monitoring, spill response, and remedial actions would comply with the items described in detail in HB In-Situ Solution Mine Operations and Closure Plan submitted to the BLM.

- Lift and booster stations—All designs would include check valves to account for anti-backflow or siphon conditions and instrumentation to monitor pipeline performance and adjust interdependent flow rates and pressures.
- Power lines—Anti-perch equipment and other raptor protection would be installed on new power lines.
- Roads
  - Vehicle access would utilize existing roads where possible.
  - Pipeline inspection roads to be constructed would be limited to a 12-foot width.
  - Where needed to maintain stable roads and minimize soil erosion, a base of up to 6 inches of crushed caliche would be placed on the running surface.
- Evaporation ponds
  - Ponds would be lined with geosynthetic liners to be covered by an 18-inch-thick layer of salt that would harden to provide protection for the liner and minimize the potential for leaks. Salt would come from existing tailings piles.
  - Ponds would be constructed with freeboard to minimize the potential for overtopping and spills.
- Reclamation following project completion
  - All wells would be plugged and abandoned in accordance with applicable rules and regulations.
  - All pond liners would be shredded and either buried onsite or removed to a permitted landfill.
  - The hardened salt layer on top of the pond liners would be excavated and disposed of according to the requirements of the NMED discharge permit.
  - All ancillary equipment would be demolished, razed, and recycled or transported to a permitted landfill for proper disposal.
  - Following the removal of all structures and infrastructure, disturbed areas would be graded and planted with native seed mixtures. Site preparation, planting, and monitoring would be performed in consultation with the BLM, with a goal of returning the property to beneficial post-mining land uses similar to pre-project conditions.

BLM Carlsbad Field Office Requirements

In addition to compliance with agency-wide and statewide BLM policies, regulations, and guidelines, the Carlsbad Field Office has developed measures and guidance designed to minimize adverse impacts to natural and cultural resources from mineral development activities in the field office area. One design feature that would be required under all action alternatives is the designation of a person onsite to monitor construction activities for compliance with federal and state permits and requirements, such as the implementation of plans required by permits and mitigation measures identified in the ROD. This construction monitor would report to the BLM on a regular basis.

In compliance with federal regulations, the BLM will set a reclamation bond for the project sufficient to ensure that reclamation is completed at the end of the project lifespan.

Table 2-9 provides a summary of the lease stipulations and environmental protection measures required by BLM policy and guidelines that would continue to be implemented within the SPA. These measures

would be applied as needed, depending on site-specific conditions to be determined by BLM resource specialists. The requirements with reference numbers starting with the number 1 are existing potash lease stipulations. The other items in the table apply more broadly to any activities in the area. More complete descriptions of these measures are included in **Appendix B**, which also contains seed mixtures developed for specific ecological sites that are currently in use in the area.

Table 2-11 Summary of BLM Environmental Requirements in the SPA

Reference #	Title	Purpose	Description[1]
1.1.1	Damage Indemnity	General	Indemnifies the federal government and the BLM against damages.
1.1.2	Compliance with Laws and Regulations	General	Requires the lessee to comply with all existing and future laws.
1.1.3	Oil and Gas Production	General	Lessee shall not unreasonably interfere with oil and gas production.
1.1.4	Pollution Removal	General	Lessee is responsible for any pollution discharged by their operations.
1.1.5	Wood and Plant Removal	General	No fuel woods or live plants may be removed.
1.1.6	Mineral Removal	General	No minerals may be removed without the appropriate permit.
1.1.7	Antiquities	General	Collection, removal, or damaging of antiquities is prohibited.
1.1.8	Cultural Resources	General	All cultural or paleontological resources discovered must be reported to the BLM immediately.
1.1.9	Cultural Survey	General	A cultural survey must be conducted and accepted by the the BLM prior to construction.
1.1.10	New Construction	General	Written approval must be obtained from the BLM prior to any construction not previously approved.
1.1.11	Fences	General	Fences must not be damaged during construction or must be repaired.
1.1.12	Gates	General	Gates and cattle guards on public lands may not be closed to public use. Gates must be kept shut to contain cattle.
1.1.13	Surface Owner Notification	General	The surface owner or grazing allottee must be notified prior to construction.
1.1.14	Scattering	General	Soil, rock, and vegetation debris must be scattered not piled.
1.1.15	Blading	General	Blading will be minimized.
1.1.16	Pits	General	After construction is completed, all pits, other than those permitted for producing mineral materials, must be backfilled.

Table 2-11 Summary of BLM Environmental Requirements in the SPA

Reference #	Title	Purpose	Description[1]
1.1.17	Trash	General	All trash must be hauled to an approved dump site.
1.1.18	Concrete	General	No concrete shall be dumped on federal land.
1.1.19	Noxious Weeds	General	The lessee is responsible for preventing the establishment of any noxious weeds or treating to eliminate weeds.
1.1.20	Painting	General	Structures must be painted with a BLM-approved color.
1.2.1	Road Width and Grade	Roads	Specifications for allowable road width and grade.
1.2.2	Surface Disturbance Width	Roads	Specifications for allowable surface disturbance width.
1.2.3	Cattle Guards	Roads	Requirements for cattle guards.
1.4.1	Core Hole Reclamation	Reclamation	Requirements and specifications for core hole reclamation.
1.4.2	Road and Site Reclamation	Reclamation	Specifications and requirements for road and site reclamation.
1.4.3	Facility Reclamation	Reclamation	Any surface structures must be removed at the end of operation.
1.4.4	Hazardous Waste Removal	Reclamation	Hazardous waste must be removed by the lessee by an approved method.
1.4.5.1	Seeding Techniques	Reclamation	Requirements for seeding.
1.4.5.2	Seed Mixture	Reclamation	Seed mixture specification.
1.4.5.3	Soil Preparation	Reclamation	Requirements for soil preparation prior to reclamation planting.
2.1.1	Damage Indemnity	General	Indemnifies the federal governmental and the BLM against damages.
2.1.2	Toxic Substances Control Act Compliance	General	Lessee will comply with TOSCA.
2.1.3	Hazardous Waste Indemnity	General	Indemnifies the federal government and the BLM against damages from toxic waste.
2.1.4	Fences	General	Fences must not be damaged during construction or must be repaired.
2.1.5	Scattering	General	Soil, rock, and vegetation debris must be scattered not piled.
2.1.6	Erosion Control Structures	General	Holder will install erosion control structures where required to stabilize soil.

Table 2-11 Summary of BLM Environmental Requirements in the SPA

Reference #	Title	Purpose	Description[1]
2.1.7	Reseeding	General	The holder will reseed disturbed areas.
2.1.8	Painting Requirements	General	Painting requirements and specification.
2.1.9	Cultural Resource Requirements	General	All cultural or paleontological resource discovered must be reported to the BLM immediately.
2.1.10	Native American Graves Protection and Repatriation Act (NAGPRA)	General	Holder must comply with the NAGPRA.
2.1.11	Pollution Removal	General	Oil or other pollutant spills must be cleaned up.
2.2.1.1	Right-Of-Way	Pipelines	Construction activity is confined to the authorized ROW.
2.2.1.2	Signage	Pipelines	Sign requirements for pipelines.
2.2.2.1	Cover	Pipelines	Pipelines must be buried 24 inches deep.
2.2.2.2	Blading Requirements	Pipelines	Blading requirements for buried pipelines.
2.2.3.1	Damage Liability	Surface Pipeline	Holder is liable for damage to the U.S.
2.2.3.2	Right-Of-Way	Surface Pipeline	Construction activity is confined to the authorized ROW.
2.2.3.3	No Blading without approval	Surface Pipeline	Blading for surface pipelines is not allowed without approval.
2.2.3.4	Minimize Suspension	Surface Pipeline	Suspension of surface pipelines over low areas will be minimized.
2.2.3.5	Crossing Burial	Surface Pipeline	Requirements for burying surface pipelines at road crossings.
2.3.1	Karst Features	Cave/Karst	The BLM is to be informed of any subsurface features encountered during construction.
2.3.2	Surface Disturbance Buffer	Cave/Karst	Surface disturbance is not allowed within 200 meters of known cave entrances or significant karst features.
2.3.3	Oil and Gas	Cave/Karst	Guidelines for oil and gas drilling and production in karst areas.
2.3.4	Protection Protocols	Cave/Karst	Cave and karst features will be avoided.
2.3.5	Aquifer Recharge	Cave/Karst	Cave and karst features with significant aquifer recharge have special requirements for construction.
2.3.6	Cave/Karst Construction Mitigation	Cave/Karst	Construction requirements for cave/karst areas.

Table 2-11 Summary of BLM Environmental Requirements in the SPA

Reference #	Title	Purpose	Description[1]
2.3.7	Cave/Karst Drilling Mitigation	Cave/Karst	Drilling requirements for cave/karst areas.
2.4.1	Invasive Plant Species	Roads	ROWs must be kept clear of invasive plants.
2.4.2	Road Width and Grade	Roads	Specifications for allowable road width and grade.
2.4.3	Crowning and Ditching	Roads	Crowning and ditching requirements.
2.4.4	Drainage	Roads	Drainage requirements for roads.
2.4.4.1	Lead-off Ditches	Roads	Lead-off ditch specifications.
2.4.4.2	Culvert Pipes	Roads	Culvert pipe specifications.
2.4.4.3	Drainage Dips	Roads	Drainage dip specifications.
2.4.5	Turnouts	Roads	Turnout requirements for roads.
2.4.6	Surfacing	Roads	Surfacing requirements for roads.
2.4.7	Cattleguard Requirements	Roads	Requirements for cattle guards.
2.4.8	Maintenance	Roads	The holder shall maintain the road in a safe and usable condition.
2.4.9	Public Access	Roads	Public access may not be restricted.
2.5.1.1	No Blading of Power Line ROWs	Power Lines	No clearing or blading of ROWs.
2.5.1.2	Power Line Signs	Power Lines	Signage requirements for power lines.
2.5.1.3	Abandonment	Power Lines	Holder must follow prescribed abandonment procedures.
2.5.1.4	Removal of Surface Structures	Power Lines	All surface structures must be removed within 180 days of abandonment.
2.5.2.1	Raptor Protection	Power Lines	Pipelines shall be “raptor safe.”
2.5.2.2	Special Power Line Stipulations	Power Lines	Dispose of poles lines and transformers properly, fill in holes, limit all disturbance to authorized ROW.
2.5.3.1	Noxious Weeds	Power Lines	Holder shall ensure that construction equipment does not spread noxious weeds.
2.5.3.2	Waste Disposal	Power Lines	Holder shall ensure that the site is maintained in sanitary condition and that waste is disposed of properly.
2.5.3.3	Limits	Power Lines	Holder shall conduct all activities within authorized limits.
2.5.3.4	Construction Trenches	Power Lines	Trenches shall be covered at night.

Table 2-11 Summary of BLM Environmental Requirements in the SPA

Reference #	Title	Purpose	Description[1]
2.5.3.5	Excavated Soil	Power Lines	Excess soil shall be evenly spread in the immediate vicinity of the excavation.
2.5.3.6	Special Buried Power Line Stipulations	Power Lines	Special requirements for buried power lines.
2.6.1.1	Interim Reclamation	Reclamation	All areas not needed for operations shall be reclaimed.
2.6.1.2	Reduction Strategy	Reclamation	Within 6 months of well completion, the holder will devise a strategy for interim reclamation.
2.6.1.3	Caliche Removal	Reclamation	Any caliche used in construction will be removed.
2.6.1.4	Reseeding Requirements	Reclamation	All disturbed areas will be reseeded.
2.6.1.5	Sundry Notice	Reclamation	A sundry notice will be submitted when reclamation is complete.
2.6.2.1	Final Reclamation	Reclamation	Final reclamation must occur after final abandonment.
2.6.2.2	Earthwork	Reclamation	Earthwork for final reclamation must be completed within 6 months of well plugging.
2.6.2.3	Revegetation	Reclamation	All disturbed areas will be reseeded.
2.6.2.4	Contact BLM prior to Abandonment	Reclamation	Operator shall contact the BLM prior to surface abandonment operations.
2.6.2.5	Abandoned Well Marker (Raptor Perching)	Reclamation	A ground level abandoned well marker shall be used to avoid raptor perching.
2.7.1	RMP Guidelines	Recreation	The rules in the 1997 RMPA will be followed.
2.7.2	Pipeline and Power Line Recreation Mitigation	Recreation	Specifications for pipelines and power lines in recreation areas.
2.8.1	Standard Range Practices	Range	Standard practices must be followed to minimize impacts to rangeland.
2.8.2	Livestock Watering Requirement	Range	Avoid or move livestock watering structures.
2.9.1	Reclamation Requirements	Visual Resources	Reclaim infrastructure to eliminate visual impacts.
2.9.2	Low Profile Facilities	Visual Resources	All permanent structures will be low profile.
2.10.1	Slopes or Fragile Soils	Soil	Surface disturbance will not be allowed on slopes over 30 percent.
2.10.2.1	Standard ROW Practices	Soil ROW	Reduce impacts to soil by following standard practices.

Table 2-11 Summary of BLM Environmental Requirements in the SPA

Reference #	Title	Purpose	Description[1]
2.10.2.2	ROW Mitigation	Soil ROW	Methods to minimize impacts including no blading, minimize traffic, temporary erosion control measures, etc.
2.10.3.1	Well Pad Standard Practices	Soil Well Pads	Reduce impacts to soil by following standard practices.
2.10.3.2	Well Pad Mitigation	Soil Well Pads	Mitigation measures for well pads.
2.11.1.1	Raptor Nests and Heronries	Wildlife	No surface disturbance within 200 meters of heronries.
2.11.1.2	Prairie Dog Towns	Wildlife	No surface disturbance within known prairie dog towns.
2.11.2.1.1	Lesser Prairie Chicken Timing Limitation	Wildlife	Timing limitations within lesser prairie chicken habitat.
2.11.2.1.2	Ground Level Dry Hole Markers	Wildlife	Ground level dry hole markers are required in prairie chicken habitat.
2.11.2.2	Sand Dune Lizards	Wildlife	No surface disturbance within occupied habitat areas.
2.12.1	Streams, Rivers and Floodplains	Watershed	No surface disturbance within 200 meters of 100-year floodplain.
2.12.2	Playas and Alkali Lakes	Watershed	No surface disturbance within 200 meters of playas or alkali lakes.
2.12.3	Standard Practices to Protect Watersheds	Watershed	Standard practices to protect watersheds.
2.12.4	Mitigation Measures To protect Watersheds	Watershed	Standard mitigation measures to protect watersheds.
2.12.5	Tank Batteries	Watershed	Requirements for tank batteries.
2.12.6	Surface Pipelines (Leak Detection Plan)	Watershed	A leak detection plan will be submitted to the BLM prior to construction.
2.13.1.1	Standard Practices to Reduce Impacts to Vegetation from Well Pads	Vegetation Well Pads	Standard practices to protect vegetation.
2.13.1.2	Mitigation to Reduce Impacts to Vegetation from Well Pads	Vegetation Well Pads	Caliche will be removed from well pads during reclamation.
2.13.2.1	Standard Practices to Reduce Impacts to Vegetation from ROWs	Vegetation ROW	Impacts to vegetation will be reduced by following standard practices.
2.13.2.2	Mitigation to Reduce Impacts to Vegetation from ROWs	Vegetation ROW	Mitigation measures to reduce vegetation impacts.
2.14.1	Mitigation for Weeds	Noxious Weeds	Mitigation measures to reduce the impact of noxious weeds.

Table 2-11 Summary of BLM Environmental Requirements in the SPA

Reference #	Title	Purpose	Description[1]
2.14.2.1	African Rue (*Peganum harmala*)	Noxious Weeds	Operator is responsible if noxious weeds become established.
2.14.2.2	Spraying	Noxious Weeds	Spraying specifications for African rue.
2.14.2.3	African Rue Management Practices	Noxious Weeds	Management practices for African rue.
2.15.1	Archaeological, Paleontological, and Historical Sites	Archaeology	All cultural or paleontological resource discovered must be reported to the BLM.
2.15.2	Historic Properties	Archaeology	Historic properties are protected by law.
2.15.2.1	Professional Archaeological Monitoring	Archaeology	Professional archaeological monitoring is required.
2.15.2.2	Monitor Duties	Archaeology	Archaeological monitoring requirements.
2.15.3	Site Protection and Employee Education	Archaeology	Employee archaeological training requirements.
2.16	Welding (Fire Prevention)	Welding	Welding requirements to prevent fire.
2.17.1	Seed Requirements	Seed Mixtures	Specifications for seed mixes for reclamation.
2.17.2	Seeding Methods	Seed Mixtures	Seeding methods for reclamation.
2.18	Waste Material and Fluids	Drilling	All waste material from drilling must be disposed of properly.

[1] Note that the measures listed in this table would be applied on a case-by-case basis, to be determined by BLM specialists depending on site-specific conditions. See **Appendix B** for more detailed descriptions.

2.5 Reasonably Foreseeable Future Actions

The activities and proposed projects listed in **Table 2-10** are reasonably foreseeable in the vicinity of the project area. Their impacts on the region will be considered in combination with the proposed HB In-Situ Solution Mine Project to determine the cumulative effects.

Table 2-12 Reasonably Foreseeable Future Actions

Project	Brief Description	Approximate Location
1. Intrepid water-saving improvements	Planned upgrades to Intrepid's East Mine langbeinite process plant, projected to be completed by the end of 2011, anticipated to decrease Caprock water usage by approximately 600 to 700 gpm.	Intrepid East Mill
2. Polyhalite mining project	Intercontinental Potash is considering a polyhalite mining operation on state and federal mineral leases and surface. The planned extraction method is underground room and pillar mining approximately 1,500 feet below the surface. Exploratory drilling is ongoing to evaluate the extent and quality of the potash formations.	In five townships in Lea County, New Mexico, approximately 9 miles from the eastern boundary of the SPA
3. BLM vegetation management	As part of the Restore New Mexico program, the BLM plans several chemical treatments to manage invasive plants (mesquite and creosote). No surface disturbance is planned.	Within and near project area
4. Construction and maintenance for recreation	There is a proposal to construct a new parking lot in the Hackberry SRMA, approximately 0.5 to 1 acre in size. Trail maintenance is ongoing and involves little, if any, surface disturbance.	Hackberry SRMA
5. Creamer water project	A private landowner is proposing to develop a well on state land to supply saline water for sale to the oil and gas industry. The water may be coming from the Rustler Formation. Also proposing a pipeline running north up a small dirt road, crossing under the highway and ending at an old caliche pit where storage tanks would be installed.	Section 2, T20S, R30E (southeast of Clayton Lake)
6. Oil and gas drilling and production	Oil and gas drilling of new wells and production from existing wells would continue in the SPA according to BLM policy and approval. It is anticipated that oil and gas drilling operations would continue at the current rate of 75 per year in the SPA and 1 per year within the project area. An average of 3.5 acres would be disturbed for each new well pad constructed.	In the SPA and project area

Table 2-12 Reasonably Foreseeable Future Actions

Project	Brief Description	Approximate Location
7. Derrick well	Intrepid recently converted an old core hole to a water supply well in the vicinity of the Rustler wells proposed for the project. The well extracts from the Rustler Formation, using the same source as the proposed new Rustler wells. Intrepid anticipates using this well at a rate of approximately 20 gpm to supplement processing water at the West Plant.	Section 1, T21S, R29E

2.6 Summary of Impacts

Table 2-11 provides a summary of the key environmental impacts for each resource analyzed. Detailed descriptions of impacts are presented for each alternative in Chapter 4.0. The summarized impacts assume the implementation of applicant-committed environmental protection measures and the BLM required environmental protection measures. However, it is not assumed that the recommended mitigation measures would be implemented. Implementation of the recommended mitigation measures identified in Chapter 4.0 potentially would further reduce impacts.

Table 2-13 Summary of Environmental Impacts

Resources Affected	No Action	Proposed Action	Alternative B	Alternative C	Preferred Alternative
Geology and Minerals					
Subsidence Hazards	Natural and historical mine-related subsidence likely to continue.	Increased potential for mining-related subsidence as more potash is removed. Maximum subsidence is 0.6 foot.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed.
Caves	No impact other than from ongoing natural and historical mine-related subsidence that may affect caves.	New access roads may increase public access of caves. Small chance that drilling into unrecorded cave/karst features may allow fresh water to enter the groundwater system or dissolve evaporite strata. 42 to 43 known caves in the project area may be affected by drawdown.	New access roads may increase public access of caves. Small chance that drilling into unrecorded cave/karst features may allow fresh water to enter the groundwater system or dissolve evaporite strata. 18 to 38 known caves in the project area may be affected by drawdown.	Same as Proposed Action.	Same as Alternative B.
Minerals	No additional potash would be recovered from inactive workings and maximum recovery of the mineral resource would not be achieved. Intrepid's conventionally mined potash leases would not exceed 96,000 acres in New Mexico.	Additional potash reserves would be recovered and the maximum recovery of the mineral resource would be achieved. The total acreage of Intrepid's potash leases may increase.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Oil and Gas	There would be no change to oil and gas's existing access to fluid minerals in the project area.	Oil and gas access to fluid minerals in the project area would not be affected.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.

Table 2-13 Summary of Environmental Impacts

Resources Affected	No Action	Proposed Action	Alternative B	Alternative C	Preferred Alternative
Paleontological Resources	Potential impacts are small.	Potential impacts are small, but may increase as public access to the area increases due to new roads.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Water					
Subwatersheds most affected by surface disturbance	None.	Clayton Basin and Maroon Cliffs.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Number of locations where surface pipelines block drainages, increasing potential erosion	None.	9	Same as Proposed Action.	0	6
Maximum Rustler area drawdown depth and acreage	No impact.	200 feet; 1,850 to 6,500 acres, depending on Rustler model used.	0 to 200 feet, depending on water source used. 200-foot drawdown contour encompasses between 1,450 and 4,750 acres, depending on Rustler model used.	Same as Proposed Action.	Same as Alternative B.
Maximum seep/spring reduction	No impact.	64%	31%	Same as Proposed Action.	Same as Alternative B.
Maximum Nash Draw flux reduction	No impact.	35%	25%	Same as Proposed Action.	Same as Alternative B.
Maximum Caprock area drawdown	No impact.	8 feet	52 feet	Same as Proposed Action.	Same as Alternative B.
Maximum Caprock area drawdown over life of project	No impact.	8 feet	34 feet	Same as Proposed Action.	Same as Alternative B.

Table 2-13 Summary of Environmental Impacts

Resources Affected	No Action	Proposed Action	Alternative B	Alternative C	Preferred Alternative
Soils					
Low revegetation potential soils disturbed	None.	792 acres	Max. 1,145 acres (existing Caprock pipeline option)	Same as Proposed Action.	862 acres
High wind erosion soils disturbed	None.	216 acres	Max. 357 acres (existing Caprock pipeline option)	Same as Proposed Action.	284 acres
Air Quality					
New HB mill emissions	None.	No exceedance of ambient air quality standards or PSD increment. PM_{10}=11.8 tpy; NO_X=12 tpy; SO_2=0.07; VOC=0.7	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
State and federal ambient air quality standards	No impacts.	Not exceeded by fugitive or stationary sources. Total project NO_X emissions <0.001% of current Eddy County emissions.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Sensitive areas	No impacts.	Not affected by emissions from project.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Climate Change					
Greenhouse gas CO_2 equivalent emissions	None.	Negligible impacts to global climate change from construction and project operations.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.

Table 2-13 Summary of Environmental Impacts

Resources Affected	No Action	Proposed Action	Alternative B	Alternative C	Preferred Alternative
Vegetation					
Vegetation types disturbed (acres)	None.	Mesquite Upland Scrub: 597 acres: Desert Scrub: 346 acres; Grassland: 44 acres.	Existing Caprock pipeline replacement: Mesquite Upland Scrub: 803 acres: Desert Scrub: 387 acres; Grassland: 154 acres. New Caprock Pipeline: Mesquite Upland Scrub: 736 acres: Desert Scrub: 377 acres; Grassland: 142 acres.	Same as Proposed Action.	New Caprock pipeline replacement: Mesquite Upland Scrub: 723 acres: Desert Scrub: 404 acres; Grassland: 142 acres.
Vegetation types most affected by groundwater drawdown (acres)	None.	Mesquite Upland Scrub: 5,932 – 6,044 acres: Desert Scrub: 2,561 – 2,622 acres; Grassland: 836 – 840 acres; Woody Riparian: 639 – 655 acres.	Mesquite Upland Scrub: 1,332 – 3,282 acres: Desert Scrub: 483 – 1,579 acres; Grassland: 738 – 425 acres; Woody Riparian: 6 – 56 acres.	Same as Proposed Action.	Same as Alternative B.
Sensitive plant species habitat potentially affected	None.	Scheer's beehive cactus: 377 acres; gypsum wild buckwheat: 128 acres.	Existing Caprock pipeline: Scheer's beehive cactus: 420 acres; gypsum wild buckwheat: 138 acres New Caprock pipeline: Scheer's beehive cactus: 420 acres; gypsum wild buckwheat: 138 acres	Same as Proposed Action.	New Caprock pipeline Scheer's beehive cactus: 443 acres; gypsum wild buckwheat: 135 acres

Table 2-13 Summary of Environmental Impacts

Resources Affected	No Action	Proposed Action	Alternative B	Alternative C	Preferred Alternative
Wildlife and Fish					
Terrestrial wildlife habitat	None.	Impacts from surface disturbance, habitat disruption, and fragmentation would be relatively minor. Less mobile small game and nongame species likely to be the most affected by surface disturbance and blockage of movements due to surface pipelines. Significant potential adverse impacts to migratory birds from exposure to evaporation pond water unless mitigation measures are implemented.	Same as Proposed Action.	Same as Proposed action with no wildlife movement blockages due since pipelines will be buried.	Same as Proposed Action with less wildlife movement blockages due to fewer and more strategically placed surface pipelines.
Sensitive Species	None.	The seven bat species, burrowing owl, loggerhead shrike, and sand dune lizard may be affected by changes to the scrub, grass, and woody riparian vegetation types due to surface disturbance or groundwater drawdown. Changes to grasslands would primarily affect the habitat of the swift fox, Baird's sparrow, lesser prairie-chicken, gray vireo, and Texas horned lizard. Impacts would be minor due to availability of similar cover types nearby.	Impacts similar to the Proposed Action, except that there is greater potential for adverse impacts to sand dune lizards and lesser prairie-chickens. However, these impacts would be minimized by implementation of the BLM's required environmental protection measures.	Same as Proposed Action.	Same as Alternative B; however, pipelines have been rerouted to avoid sand dune lizard habitat to avoid potential for adverse impacts.

Table 2-13 Summary of Environmental Impacts

Resources Affected	No Action	Proposed Action	Alternative B	Alternative C	Preferred Alternative
Rangelands/ Livestock Grazing					
Animal unit months (AUMs) lost due to permanent facilities	No new disturbance.	125 AUMs lost; most (86) in Maroon Cliffs allotment. Most AUM reductions would occur on private land.	Existing Caprock pipeline option: 173 AUMs lost; most (88) in Maroon Cliffs allotment. New Caprock pipeline option: 152 AUMs lost; most (86) in Maroon Cliffs allotment Most AUM reductions would occur on private land.	Same as Proposed Action.	148 AUMs lost; most (88) in Maroon Cliffs allotment. Most AUM reductions would occur on private land.
Lands and Realty					
Effect on other land uses	None.	Temporary minor impacts on vehicle traffic in and near project area during construction; aboveground pipelines may affect land user travel and other land uses in the future.	Same as Proposed Action.	Temporary minor impacts on vehicle traffic in and near project area during construction.	Same as Proposed Action; however, 68% of the pipelines would be buried.
Recreation					
Effect on recreational uses	No additional disturbance.	5% of Hackberry SRMA acreage within potential subsidence area; increased public access by vehicles due to new roads; aboveground pipelines may obstruct OHV trails. Construction and operation activities may disrupt dispersed recreational users.	Same as Proposed Action.	5% of Hackberry SRMA acreage within potential subsidence area; increased public access by vehicles due to new roads. Construction and operation activities may disrupt dispersed recreational users.	Same as Proposed Action; however, 68% of the pipelines would be buried. All of the pipeline within Hackberry SRMA would be buried, resulting in fewer changes to OHV trails and access.

Table 2-13 Summary of Environmental Impacts

Resources Affected	No Action	Proposed Action	Alternative B	Alternative C	Preferred Alternative
Visual Resources					
Viewshed modifications	No change.	Slight to moderate modifications of the viewshed by the addition of man-made features. In compliance with VRM Class IV management.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Cultural Resources					
Effect on archaeological sites	None.	Potential direct effects to National Register of Historic Places (NRHP)-eligible sites from construction would be avoided or mitigated through data recovery. Potential loss of ineligible sites. Increased public access may result in more illegal collecting.	Same as Proposed Action.	Same as Proposed Action	Same as Proposed Action.
Hazardous Materials, Health and Safety					
Emergency plans	Existing emergency response and spill plans.	Development of new emergency response and spills plans, new health and safety training for new employees.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Socioeconomics, Environmental Justice					
Total Employment (# of employees)	629 current existing employees at Intrepid facilities near the project area.	In addition to existing work force: Short-term (peak) : 274 Long-term: 36	In addition to existing employees: Short-term (peak): 285 Long-term: 36	Slightly higher than the Proposed Action, fewer than Alternative B.	In addition to existing work force: Short-term (peak) : 272 Long-term: 36
Indirect or Induced employment	N/A.	Short-term average: 194 Long-term: 19	Short-term average: 204 Long-term: 19	Slightly higher than the Proposed Action, fewer than Alternative B.	Same as the Proposed Action, but longer duration.

Table 2-13 Summary of Environmental Impacts

Resources Affected	No Action	Proposed Action	Alternative B	Alternative C	Preferred Alternative
Population changes	None.	+Short term: Up to 221 for construction Long term: +24 for operations.	+Short term: Up to 233 for construction Long term +24 for operations.	Same as Alternative B	Same as Proposed Action.
Housing demands	None.	Short term: Peak of 140 units, mostly motel rooms, RV camp sites and apartments in Carlsbad Long term: 10 units	Short term peak of 147 units, primarily in Carlsbad Long term10 units	Slightly higher than the Proposed Action, fewer than Alternative B.	Same as Proposed Action.
Federal mineral royalties, annual	No change.	Between $2.3 million and $4.7 million in addition to existing for potash production.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Local property taxes, annual	No change.	Between $0.53 million and $1.05 million annually.	Slightly higher than Proposed Action due to higher capital investment.	Same as Alternative B.	Same as Alternative B.
Gross receipts, personal and corporate income taxes; life of project	No change	As much as $9.8 million in addition to those from existing operations	Slightly higher than the Proposed Action	Slightly higher than the Proposed Action, lower than Alternative B.	Same as Alternative B
Environmental justice	No disproportionate adverse effects on minority or low-income populations.	Same as No Action.	Same as No Action.	Same as No Action.	Same as No Action.